

# COMMERCIAL FISHERIES Review

VOL. 30, NO. 5

DIV. OF FISHES

MAY 1968

M



Fishing vessels in port at Sfax, Tunisia.

# *COMMERCIAL FISHERIES*

## *Review*

A comprehensive view of United States and foreign fishing industries--including catch, processing, marketing, research, and legislation--prepared by the Bureau of Commercial Fisheries.



Fishermen's Memorial  
Gloucester, Mass.

Managing Editor: Edward Edelsberg

Production Manager  
and Associate Editor: Jean Zalevsky

Production: Alma Greene (Senior Compositor)  
and Mary Andrews

The Bureau of Commercial Fisheries and  
The Bureau of Sport Fisheries and Wildlife  
make up The Fish and Wildlife Service of  
The United States Department of the Interior.

Throughout this book, the initials BCF stand  
for the Bureau of Commercial Fisheries.

Address correspondence and requests to: Commercial Fisheries Review, 1801 North Moore Street, Room 200, Arlington, Va. 22209. Telephone: Area Code 703 - 557-4246.

Publication of material from sources outside the Bureau is not an endorsement. The Bureau is not responsible for the accuracy of facts, views, or opinions of these sources.

Although the contents have not been copyrighted and may be reprinted freely, reference to source is appreciated.

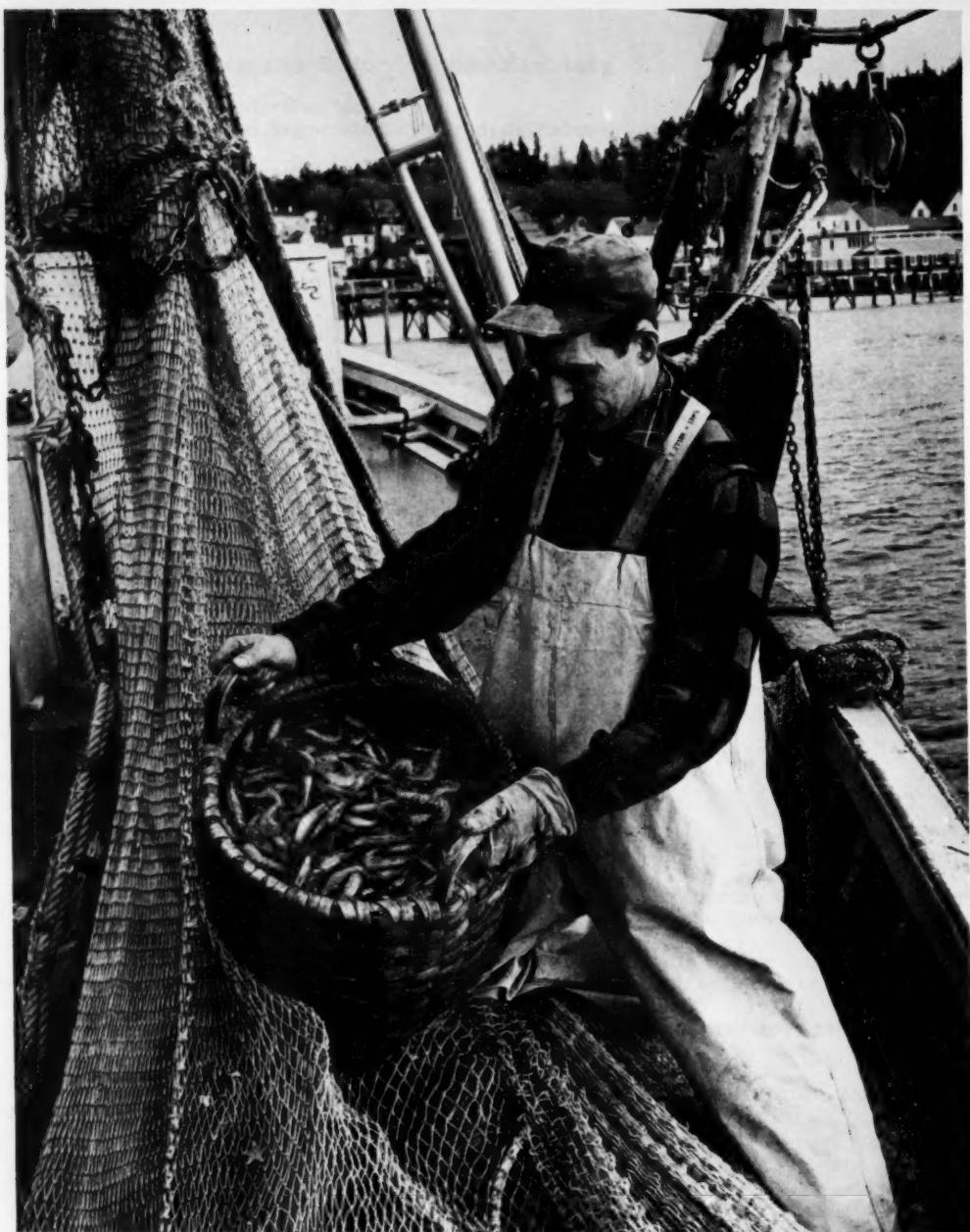
Use of funds for printing this publication was approved by the Director, Bureau of the Budget, April 18, 1968.

For sale by the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402.  
Price 60 cents (single copy). Subscription Price: \$6.50 a year; \$2 additional for foreign mailing.

THE U.S. ECONOMIC FISH SITUATION

## CONTENTS

	Page
<b>UNITED STATES</b>	
Events and Trends .....	1
States .....	19
<b>ARTICLES .....</b>	<b>24</b>
Trends in the Atlantic Sea Scallop Fishery, by Julius A. Posgay	
Competition for Aquatic Environment, by Dr. Roland F. Smith	
U. S. and Japan Conduct Salmon Research in Cooperative Cruise, by	
Robert R. French	
Parachute-Type Sea Anchor, by Fred W. Hipkins	
<b>INTERNATIONAL .....</b>	<b>36</b>
<b>FOREIGN</b>	
Canada .....	51
Europe .....	54
Latin America .....	61
Asia .....	63
Caribbean .....	68
Africa .....	69
Mid East .....	70
<b>INDEX .....</b>	<b>71</b>



A basketful of northern shrimp taken within 50-mile radius of Boothbay Harbor, Maine. (Photo: R. L. Dow)

## THE U. S. EDIBLE FISH SITUATION

In the early months of 1968, supplies of edible fishery products ran 10 to 12 percent below a year earlier. Tighter supplies resulted in rising prices for most fishery products.

April 1 stocks of edible frozen fish were 12 percent below April 1, 1967. Stocks of frozen fillets and fish sticks and portions were a fifth lower than a year earlier. Holdings of cured fish were down about a third. Total stocks of shellfish were 6 percent above a year earlier because of plentiful supplies of processed shrimp products. Stocks of raw, headless, shrimp were adequate. Stocks of other shellfish were scarce.

During January-February, imports of fishery products were slightly higher than during the same months in 1967. Domestic landings were about the same to slightly below.

### Late Spring-Early Summer

Supplies of fish and shellfish will increase seasonally during late spring and early summer as domestic landings pick up. However, total supplies are expected to continue below year-ago levels. The quantity of fish in Canada, a major U. S. supplier, is also 10 to 15 percent below last year.

Normally, a small seasonal decline in fish prices occurs in the second quarter. It is likely that prices will not show the usual seasonal decline in the second quarter because of tight supplies. Retail prices rose gradually from November 1967 to February 1968. The sharp increase in wholesale prices in

November and December 1967 is likely to be reflected in gradual increases in retail prices in the second quarter of 1968.

### 1968 Forecast

Despite lower supplies and higher prices, total consumption of fish and shellfish is expected to increase in 1968. However, indications point to a slight decline from 1967 in per-capita consumption of fresh and frozen fish. A substantial gain in imports and/or domestic landings would be necessary to keep per-capita consumption of fresh and frozen fish at year-ago levels. Per-capita consumption of canned fish and shellfish likely will hold at the 1967 level.

Among the popular fresh and frozen fillet items, only supplies of cod are likely to increase over a year ago. Supplies of haddock--and probably flounder too--are expected to decline again in 1968.

In sticks and portions, current supplies are a fifth below 1967. Any increase in sales likely will be for fish portions rather than fish sticks.

### West Coast Fisheries

In the West Coast fisheries, supplies of halibut will be adequate for consumer needs. Halibut prices are currently below year-ago levels but are expected to rise during the annual marketing year that began in April.

Canned salmon stocks have been short in recent months. Landings of salmon are expected to improve over the very low level of

last year; prices likely will ease somewhat from current levels, depending on abundance.

Supplies of king crab, imported lobster tails, live lobsters, and scallops are scarce; prices are record high.

King crab landings in Alaska in early 1968 were much below a year earlier. Prices rose steadily. Even when landings pick up seasonally in the summer, prices are not expected to decline very much.

#### Lobster Tail Imports

Imports of lobster tails are seasonally heavy. As a result, a slight increase in holdings was evident in recent months; however, holdings continue well below a year earlier. The current volume of imports brought about a slight but temporary decline in lobster tail prices. Even if imports become abnormally heavy in the next month or so, prices would not be expected to drop to year-earlier levels.

#### Scallops Gain Gradually

Stocks of scallops showed a gradual gain in early 1968 but still were well below a year

earlier. The tremendous increase in prices during second-half 1967 apparently leveled off. Prices of scallops probably will weaken a little when fishing increases seasonally in the spring, but they will remain far above year-earlier levels.

#### Shrimp Plentiful

Stocks of processed shrimp products--breaded, peeled and deveined, and specialty products--are plentiful. Stocks of raw, headless, shrimp are heavier than a year ago, but supplies of larger shrimp are scarce and adequate only in medium sizes. Prices of raw, headless, shrimp are expected to continue gradually upward until about June 1. After that, prices for medium and small shrimp can be expected to decline seasonally as landings from the new crop are received. The seasonal decline is not expected to be as great as a year ago. Prices for large shrimp are expected to continue gradually upward until volume production begins in late summer. (BCF Branch of Current Economic Analysis.)



# UNITED STATES

## Shellfish Prices Expected to Remain High in 1968

In 1967, the harvest of shellfish other than shrimp declined. Imports were lower. Together, these factors helped boost prices in several categories to record highs. Record shrimp landings gave the U. S. its first \$100 million fishery.

This, and much other information, is contained in BCF's annual review, "Shellfish Situation and Outlook." It lists sea scallops, soft clams, king crab, blue crab, live northern lobsters, and lobster tails as record-breakers in wholesale pricing. Small declines from 1966 record prices are estimated for frozen shrimp and hard clams; but both were still well above average price levels in 1967. The only significant weakening occurred in the market for shucked oysters; it dropped nearly 9 percent below the 1966 average.

### Shrimp

U. S. shrimp landings in 1967 were 191 million pounds (headless weight). Shrimp imports were a record 202 million pounds. At the beginning of 1967, inventories were above average. These elements combined made a total of 436 million pounds of shrimp available to U. S. consumers during the year. U. S. consumption of fresh and frozen shrimp for 1967 is estimated at 290 million pounds, based on South Atlantic and Gulf landings, a 6-percent gain over 1966.

### Sea Scallops

Supplies of sea scallops dropped about 30 percent in 1967. The domestic catch of 10 million pounds was 40 percent below 1966's relatively low catch; imports of 13.5 million pounds were the lowest since 1963. Because supplies were short, the 1.2-million pound carryover for Jan. 1, 1968, was the lowest since 1946. The estimated total U. S. scallop consumption of 25.6 million pounds in 1967 was the lowest since 1958. Sales for the first 4 months of 1968 are expected to reach only 6 million pounds; they were 8 million for the 1967 period.

### Lobsters

Domestic catch and imports of northern lobsters continued to decline. The 1967 imports of 15.6 million pounds were the lowest since 1945. Total U. S. landings in 1967 are estimated at 24.8 million pounds; these include 16.1 million pounds from Maine waters. Dockside lobster prices in 1967 were 8 percent above 1966. Wholesale prices for early 1968 are averaging about 50 cents a pound higher than prices of early 1967.

In the scallop fishery, decreasing abundance has been reflected in a smaller number of boats making fewer trips. The lobster, however, is pursued by means more accessible to the amateur. The smaller number of full-time lobstermen has been offset by more casual fishermen--all setting more traps than before. The net result is increased effort in this fishery.

Lobster supplies for first-half 1968 are expected to be no greater than those in 1967, possibly a little lower. Prices will probably continue above year-ago levels.

### Spiny Lobster Tails

Consumption of spiny lobster tails in 1967 is estimated at 30.3 million pounds--8 percent over the previous two years. Supplies were down slightly from 1966. They totaled 34.1 million pounds, including 27.3 million in imports. The Jan. 1, 1968, carryover of 3.8 million pounds represented a drop of 44 percent below Jan. 1, 1967.

At the mid-April record price level (about \$2.65 per pound wholesale), spiny lobster sales are expected to be about 10 million pounds for Jan.-April 1968. The demand will probably be strong enough to prevent any sizable increase in holdings.

### Aquaculture

The U. S. Government wants to help solve the problem of high prices and scarce supplies of shellfish. The U. S. is broadening its investigation of the technical and economic feasibility of aquaculture. Other areas of

study include improved techniques for forecasting available supplies, and more effective ways to locate and harvest various species.



### **U. S. Studies Effects of Imports on Some Fish**

BCF is studying the effects of groundfish imports on the health of the U. S. industry. BCF acted at the request of Congressmen and representatives of the New England and Pacific Northwest sections of the industry.

The 2-month study will involve cod, haddock, hake, pollock, cusk, ocean perch, and flounder. It will deal only with imported fillets and blocks. Frozen fish blocks become fish sticks and portions, among the most popular ready-to-cook or ready-to-heat products.

#### **Imports Almost Doubled**

BCF statistics show that in the past 10 years imports of groundfish fillets and blocks soared from 161,369,000 to 316,860,000 pounds. While this was going on, major parts of the U. S. groundfish industry complained of falling sales.

In 1967, imports contributed a major part of U. S. consumption of these items.



### **Fur Seal Auction Held**

The Fouke Fur Co. held its spring sale in Greenville, S. C., April 4-5, and 23,167 Alaska sealskins were sold for the account of the U. S. Government. Prices for dressed, dyed, machined, and finished skins (DDM&F) averaged \$111.47, 31.2 percent above the September 1967 sale. Blacks increased 40.8 percent, Mataras 29.3 percent, and Kitovis 8.8 percent. One lot of Mataras skins sold for \$202, considered a record for this product. A year ago, one lot of Mataras sold for \$190, a record at that time. Natural Lakodas averaged \$90.71--27.2 percent higher than the previous sale. Sandrift Lakodas averaged \$58.61 and Dark Blue Lakodas averaged \$39.52, down 18.7 and 43.7 percent, respectively.

### **Income for U. S. & Alaska**

Total sale income to the U. S. Government was \$1,690,000. Payment to Alaska in fiscal year 1969 under provisions of the Alaska Statehood Act should amount to about \$325,000.



### **Walleye Tagging Study Slated for Eastern Lake Erie**

BCF biologists will conduct a walleye-tagging project in the New York waters of Lake Erie this spring. The study will be directed by Harry Van Meter, chief of BCF's Lake Erie investigations. Tentative plans call for capturing and tagging 6,000 walleyes offshore from Barcelona and Dunkirk, New York, during May. To do this, BCF has engaged a commercial fisherman for the netting operations. Research biologists will be aboard the vessel to tag the walleyes and record measurements. The fish will then be released in the immediate vicinity of capture.

#### **Study's Objectives**

The study's primary objectives will be to determine whether these walleyes move to other parts of the lake, how fast they grow, and how abundant they are. The numbers of walleyes frequenting the eastern basin of Lake Erie have increased during the past decade; those in the western basin have declined tremendously. Other than this, very little is known of the natural history of the walleye in the eastern basin. A similar walleye-tagging study was conducted in the western basin in 1959. The findings were published in 1963.

The tag is a small, yellow, neoprene tube commonly called a "dart tag." It is partially inserted into the flesh just below the dorsal fin. It is about 4 inches long and bears a printed number and mailing address.

The success of the eastern basin study will depend on the voluntary return of tags. Sport and commercial fishermen are requested to send in the tag with information about place of capture, date, and length of fish. Fishermen who return the tags will be notified of the area of release and other pertinent data on the fish they caught.



## Udall Approves Clean-Up Program for Lake Michigan

Secretary of the Interior Stewart L. Udall has approved a Federal-State program to help restore the water quality of Lake Michigan. He recommended a course of action for cities, industries, and State and Federal Governments to reduce the pollution of Lake Michigan. The program is based on suggestions coming out of an enforcement conference in Chicago, Ill., in Jan., Feb., and March 1968, of the 4 states bordering Lake Michigan and the Federal Government.

Officials from Michigan, Indiana, Illinois, and Wisconsin said after the conference that "Lake Michigan is a priceless natural heritage which the present generation holds in trust for posterity, with an obligation to pass it on in the best possible condition."

### Highlights of Udall's Recommendations

Highlights of Secretary Udall's recommendations to curb the serious pollution of Lake Michigan include:

- By the end of 1972, all cities in the Lake Michigan Basin must provide at least 80 percent removal of phosphorous from their wastes. They must comply with the water-quality standards approved by Secretary Udall for Lake Michigan. Phosphorous is a key fertilizer of algae, rapidly growing tiny plants that are a serious pollution problem.
- Industries must curb their pollution to comply with Lake Michigan water-quality standards approved by Udall. This must be substantially accomplished by December 1972.
- Representatives of those who participated in the conference will agree within 60 days on uniform rules and regulations to control wastes from boats.
- Disinfection must be continuous for all municipal wastes. This must be done as soon as possible and no later than May 1969.
- Eliminate the discharge of oil into Lake Michigan. The State conferees recommended strengthening of Federal legislation controlling oil pollution.
- Stop dumping of polluted dredging materials into Lake Michigan as soon as possible. The Army Corps of Engineers and the

States are requested to report within 6 months on what they are doing about it.

- The States and the U. S. should support a program to control or prevent pollution resulting from die-off of alewives, small inedible fish. Last summer, millions of these died in Lake Michigan.
- Ask U. S. Department of Agriculture to report to conferees within 6 months on agricultural programs to prevent pollution from siltation.
- Within 6 months, each State water-pollution control agency shall list cities and industries discharging wastes into Lake Michigan Basin. Interior Department will provide a list of Federal installations discharging wastes into the Lake. Develop a plan to treat all wastes harming Lake Michigan.
- Encourage discharge of treatable industrial wastes, following needed preliminary treatment, to municipal sewer systems.
- Effective immediately, combined sewers are to be separated in coordination with all urban reconstruction projects and prohibited in all new developments. Exceptions are where other techniques can be applied to control such pollution. Pollution from combined sewers is to be controlled by July 1977.
- The States and Interior will appoint members to a special committee to consider the problem of waste from nuclear power plants, including possible thermal pollution.
- Each State water-pollution control agency should speed programs to provide maximum use of area-wide sewage facilities.
- A technical committee on pesticides will be established to recommend a program to monitor and control this type of pollution.
- Appoint a committee to develop recommendations for a coordinated State-Federal monitoring program in the Lake Michigan Basin.
- State agencies and Interior should inventory all sites of potential major spills of oil and other pollutants.
- State agencies should arrange for water-quality analyses to be performed at least twice weekly at these water-filtration plants:

Green Bay, Milwaukee, Evanston, Chicago (both plants), Gary, Michigan City, Benton Harbor, and Grand Rapids.

- The Coast Guard will be asked to report on plans to monitor pollution in Lake Michigan by aircraft and other means.



### Cut Weight Loss When Smoking Halibut and Salmon

An experiment that reduced the considerable loss or shrinkage normally occurring in the smoking process during commercial production of smoked halibut and salmon was conducted by BCF's Technological Laboratory in Seattle, Wash.

The commercial process consists of soaking pieces of slacked (defrosted) fish for 45 minutes in a saturated sodium chloride ( $\text{NaCl}$ , common salt) brine solution. Smoking continues overnight at  $60^{\circ}$  to  $70^{\circ}$  F. Then the pieces are heated for an hour at  $180^{\circ}$  to  $190^{\circ}$  F.



*Smokehouse.*

### The Lab's Experiment

In the Seattle lab's experiment, pieces of halibut were preheated with solutions containing sodium tripolyphosphate (TPP) before smoking. The researchers found that TPP reduced the loss in weight during the smoking operation. Adding 2% TPP to the saturated brine solution used to soak the fish for the 45-minute period reduced weight loss from 30% to 25%.

Using a short, 1-minute dip in 7.5% TPP solution containing 2%  $\text{NaCl}$  reduced weight loss to 26%. The TPP did not affect flavor or texture of the smoked product.



### Sport Fishing Licenses Rose Slightly in FY 1967

State hunting and fishing permit sales in the U. S. increased slightly in fiscal year 1967. Total income from them to the wildlife agencies reached \$154 million. So announced Interior Department's Bureau of Sport Fisheries and Wildlife on April 22, 1968.

The Bureau compiles the fiscal year figures from reports of the 50 States. The reports showed 20 million hunting licenses, tags, permits, and stamps issued in fiscal year 1967--about 500,000 over FY 1966. Total fishing licenses, tags, permits, and stamps issued increased from 26 to 27 million.

### Sportsmen's Outlays

Expenditures by hunters for permits increased from \$77 million to \$81 million. For fishermen, the increase was from \$67 million to \$73 million. Bureau Director John S. Gottschalk said: "These increases are small, but healthy," demonstrating that fishing and hunting continue to be a major form of recreation in our society."

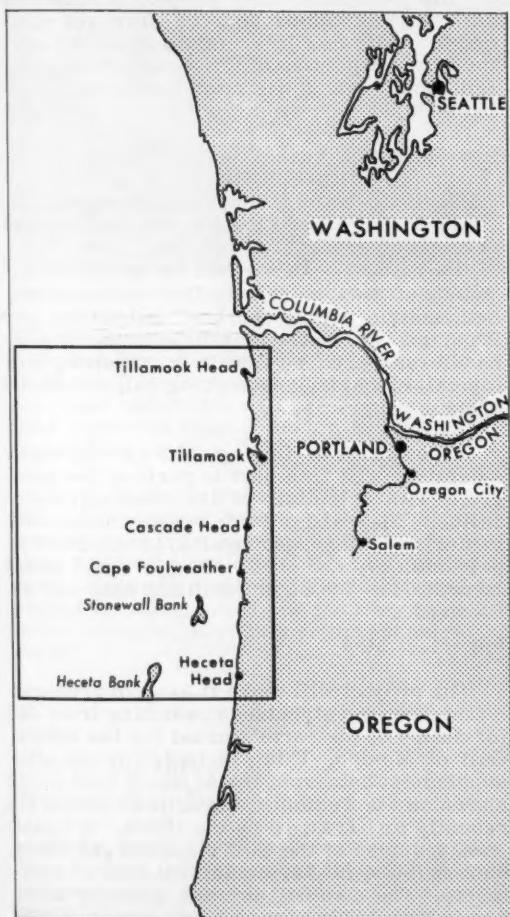
Pennsylvania led all states in hunting permits issued; California was way ahead in fishing permits.



## OCEANOGRAPHY

### Sea Bottom Off Oregon Mapped

The Coast and Geodetic Survey has published a bathymetric map covering 14,000 square statute miles of sea bottom off the Oregon coast. The map includes 2 banks rising to within 78 and 150 feet of the surface. It provides the most detailed bottom topography ever published for this section of the Pacific Ocean.



Area covered by bathymetric map (1308N-22) of sea bottom off Oregon issued by ESSA Coast and Geodetic Survey.

The map covers 100 miles offshore for a 140-mile coastal stretch between Heceta Head and Tillamook Head. The depths range from a few feet off the coast to more than 9,800 feet about 80 miles west of Heceta Head.

Depth contours reveal in detail a relatively smooth bottom for about 60 miles offshore. This is followed by a series of valleys and ridges. Prominent underwater features include: Heceta Bank, about 35 miles offshore, rising to within 150 feet of the ocean's surface; and Stonewall Bank, about 17 miles from Oregon shore, about 78 feet below surface.

### West Coast Maps Planned

The Coast and Geodetic Survey plans a series of maps for the entire Pacific coast and for the seabeds off the Atlantic and Gulf of Mexico coasts. The maps are designed to aid U. S., State, and industrial interests explore and develop the potential resources of the Continental Shelf. This is an area of about 862,000 square statute miles off the U. S. coasts. Economic development of these resources depends heavily on bottom topographic maps; few exist.



### Six-Month Hydrographic Survey of Massachusetts Coast Underway

The U. S. Coast and Geodetic Survey is conducting a 6-month hydrographic survey of the Massachusetts coast. Part of a 5-year program begun last year, it includes detailed measurements of the Beverly and Salem harbors.

The 162-foot, 760-ton, 36-man USC&GS ship "Peirce" began the survey in mid-April and will continue until October. It will cover the coastal area from Beverly and Salem, north to Gloucester, where last year's survey ended, and then out to sea and south in a clockwise move to a point off Marblehead.

The survey will not cover recently surveyed Cape Cod Bay, or the area in and around Boston Harbor, also previously surveyed, except for Winthrop Harbor. But the survey will



Box indicates area of Massachusetts coast being surveyed by ESSA Coast & Geodetic Survey as part of a five-year program which began last year. Survey will resume at Beverly and Salem and continue this year north toward Gloucester.

embrace all other coastal harbors as far as Cape Cod by the time it is completed.

#### The Operation

Operating from the ship and from launches, the Peirce's hydrographers measure and record depths as determined by the time required for a sound wave produced in the vessel's hull to reach bottom and its echo to return. The return echo is recorded on a permanent graph at rapid intervals; the echoes form a continuous profile of the sea floor as the vessel covers a predetermined course. The hydrographers obtain the shape and slope of submerged elevations and depths, including any existing significant features, such as peaks, deeps, canyons, and cliffs.



## Geologic Study of Gulf of Mexico Begins

Scientists of Interior Department's Geological Survey and the U.S. Naval Oceanographic Office have teamed up on a 1-year geologic study of the Gulf of Mexico. Part of the study is underway. The project seeks to "obtain new and significant knowledge of the major earth structures that underlie the Gulf, and the mineral resource potential of sea floor sediments and sub-seafloor rocks."

The joint Navy-USGS project is described as "the most comprehensive effort yet planned to obtain new information about the nature and properties of a major part of the Gulf floor--which has a total area of more than 600,000 square miles."

#### New Research Vessel

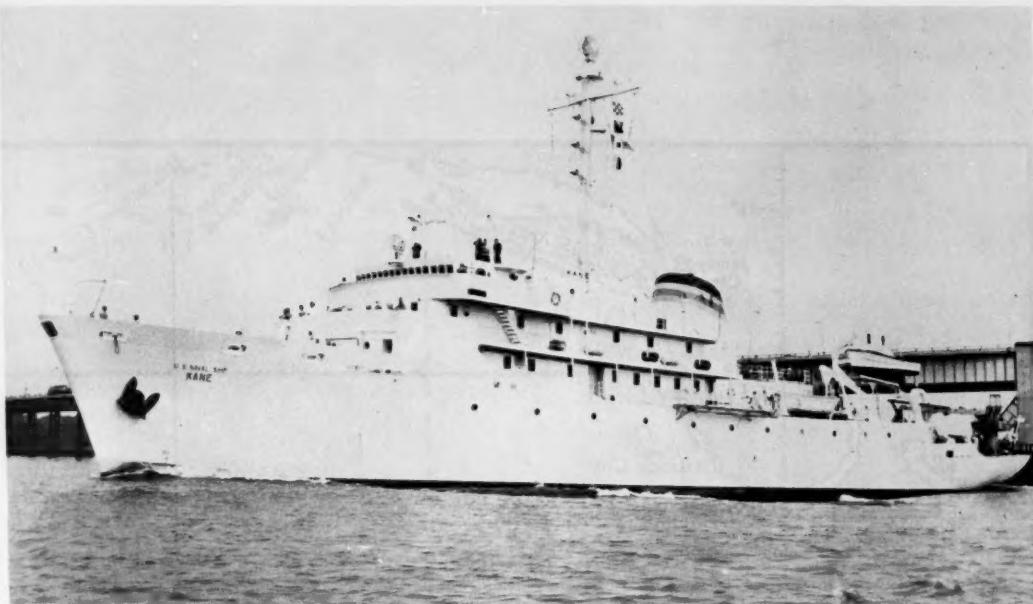
Geological and geophysical surveys will be conducted aboard the Navy's newest oceanographic research vessel, the 300-foot "Elisha Kane." The vessel is capable of obtaining continuous sea-surface temperature, bathymetric data, "sparker" subbottom profiles, and magnetic measurements. It will handle and process data from physical, biological, chemical, meteorological, and photographic programs.

About 20 U.S. Geological Survey earth scientists will take part in parts of the program with scientists of the Oceanographic Office. They will provide research support in marine geology, geophysics, geochemistry, paleontology, and hydrology. Land-based laboratories and other facilities also will be involved.

#### Important Map

The project will make it easy to prepare a map showing structures resulting from deformation of the earth's crust for the entire Gulf of Mexico. This "tectonic" map will supplement data from the adjacent land areas shown on the Tectonic Map of North America recently published by the USGS. It would show features of the Gulf's submerged lands, such as folds, faults, and thicknesses of sediments. The map will provide answers about a major unknown area in knowledge of North America's geologic structure.

There will be a geochemical laboratory aboard the Kane that can determine even



USGS oceanographic research vessel Elisha Kane.

trace amounts of minerals present in cores collected from the sea floor during the cross-Gulf cruises. Hundreds of analyses of sea-floor sediments will provide for the first time a general view of the entire Gulf's geochemistry.

The 2 agencies stated: "Both the Navy and the Geological Survey wish to encourage participation from all scientific groups concerned with the geology of the Gulf of Mexico... discussion will be held with interested parties in universities and industry to assist in the formulation of this comprehensive study."



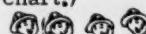
## Whales Observed in Western Gulf Stream

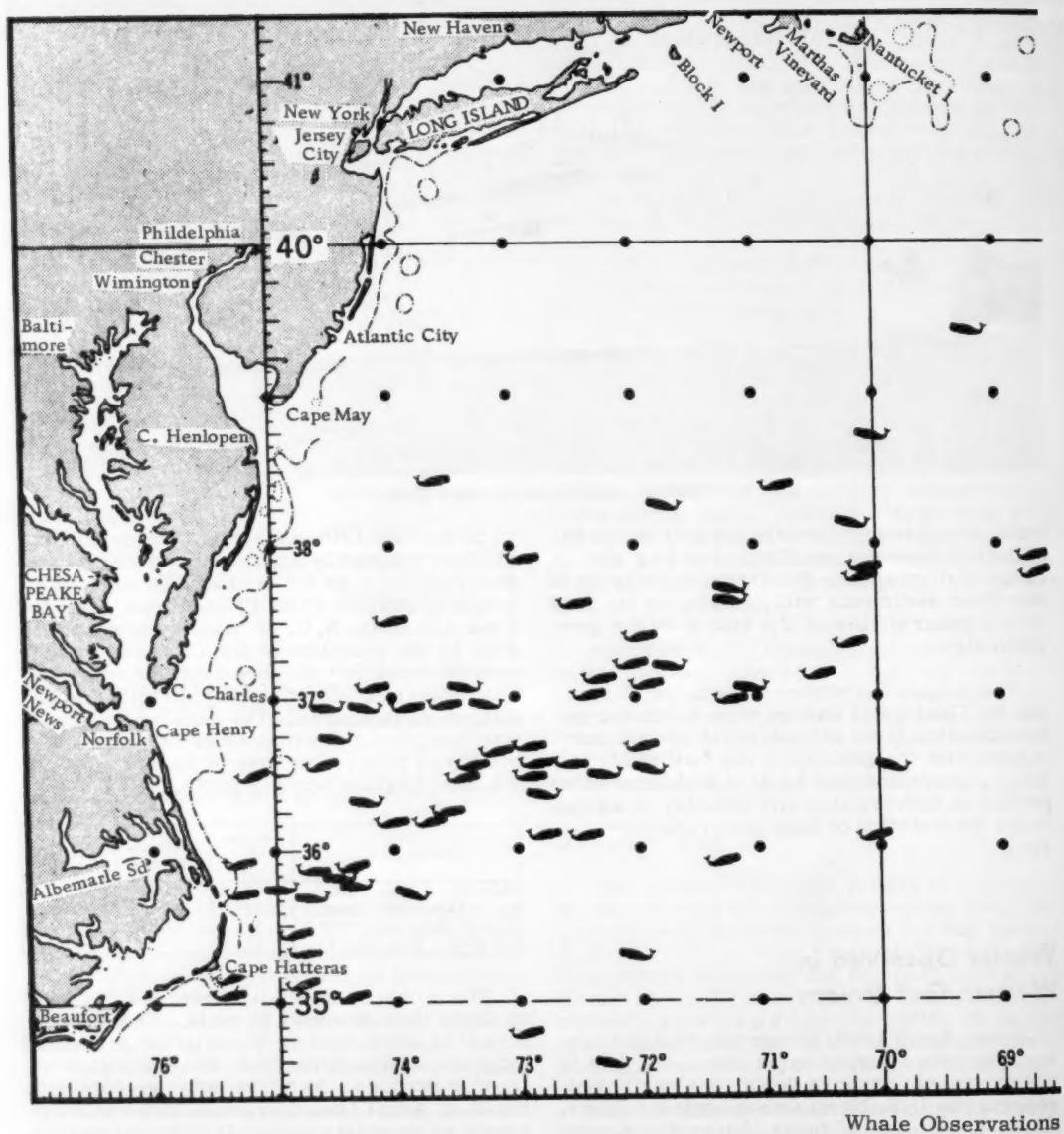
Since April 1966, numerous whales have been observed during more than 200 hours of oceanographic surveys conducted by aircraft, reports the U. S. Naval Oceanographic Office. About 90 percent of these observations were made in or near the western part of the Gulf Stream.

In the late 18th and early 19th centuries, whalers frequently hunted in an oceanic region they knew as the Southern Ground. This extended roughly from Philadelphia, Pa., to Cape Hatteras, N.C. It was bounded on the west by the coastline of the U. S. and on the east by about 60° W. Sea captains noted the Gulf Stream's effect on the distribution of whales in this area. The Southern Ground was less productive than other Atlantic areas, but it was popular because of its proximity to the New England whaling ports.

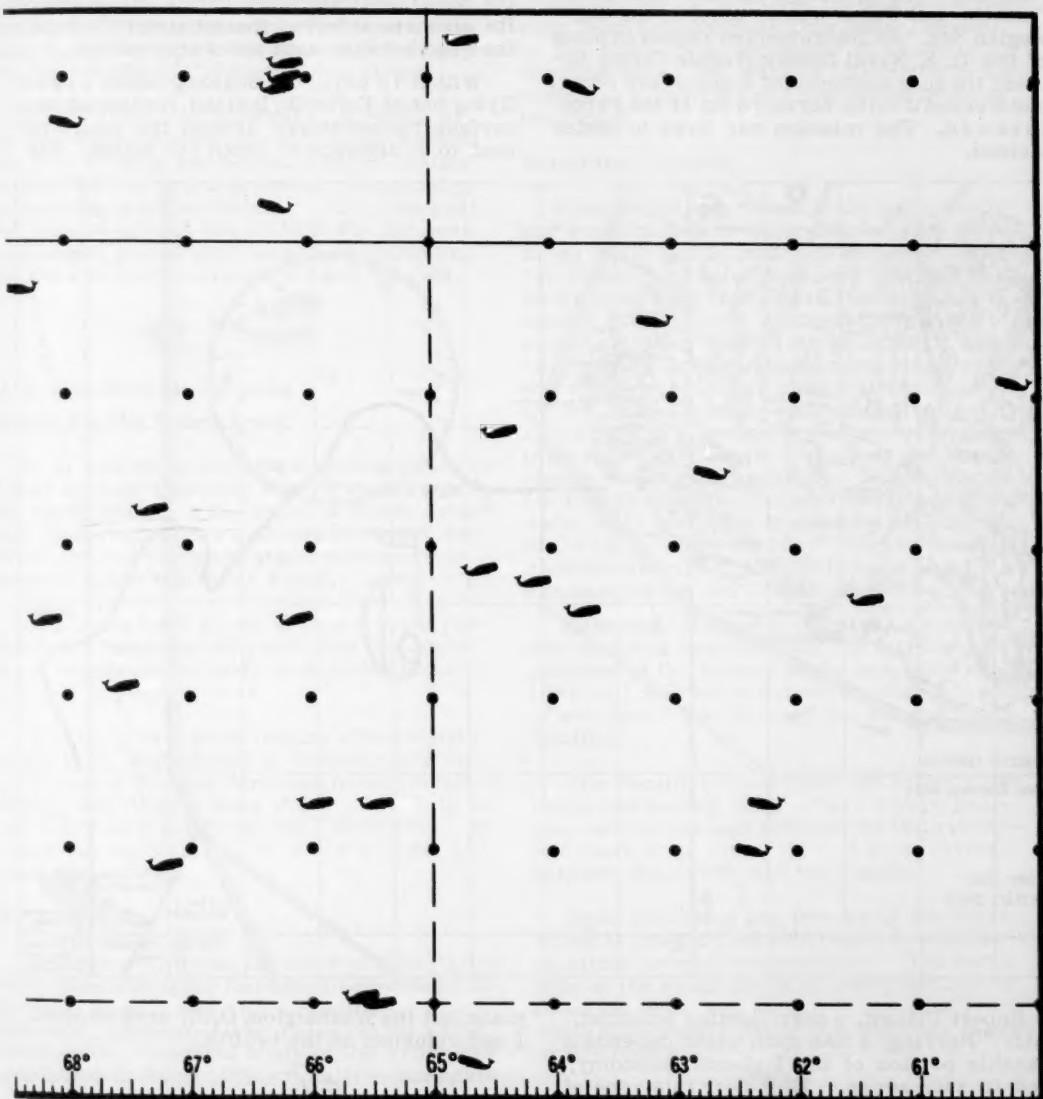
Season	Number of Whales	Hours Observed	Whales Observed Per Hour
Winter (Jan., Feb., March)	14	30.0	0.5
Spring (April, May, June)	52	43.6	1.2
Summer (July, Aug., Sept.)	42	100.0	0.4
Fall (Oct., Nov., Dec.)	24	52.7	0.5

The number of whales observed per hour of flight time is shown in table. The spring peak is attributed to the whales' northward migration through the Gulf Stream region to feeding grounds. As more data are obtained, the U. S. Naval Oceanographic Office will attempt to correlate the whale observation rate with environmental factors. (See the following pages for chart.)





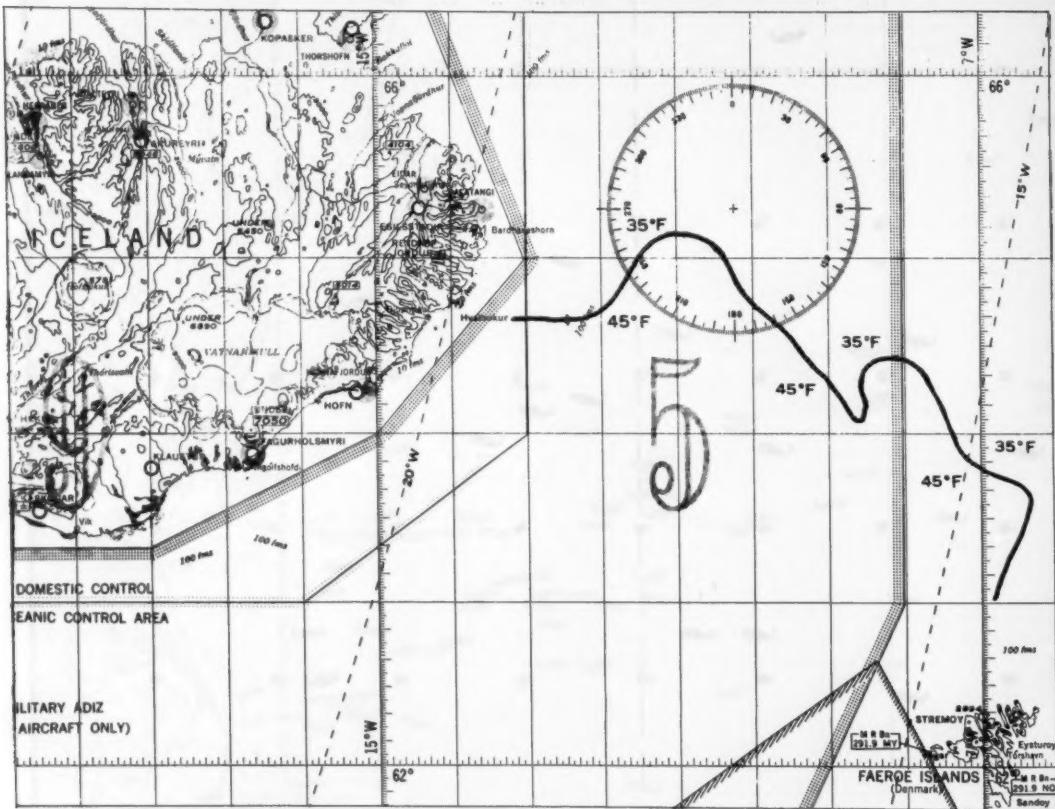
177.27 "Along the Gulf Stream." Vertical scale, 100 fms. Actual distance between stations 10 miles.



Along the Gulf Stream.

## Navy Tracks Herring Zone for Iceland

For the first time in oceanography, a plane was used to locate and track the zone where Atlantic and Polar waters meet in the Norwegian Sea. An instrumented research plane of the U. S. Naval Oceanographic Office located the zone southeast of Iceland (see chart) and tracked it to the northern tip of the Faroe Islands. The mission was flown to assist Iceland.



Robert Pickett, a participating scientist, said: "Herring, a fish upon which depends a sizeable portion of the Icelandic economy, feed in such zones. Last year this zone of demarkation between cool and warmer waters moved away from Iceland. Although herring were caught last year, the fishing fleet was so far from home that the catch spoiled on the trip back."

## Infrared Thermometers Used

To offset the approaching repetition of such losses, Dr. Steingrimur Hermansson, Head of Iceland's National Research Council, asked the Naval Oceanographic Office to use one of its airborne infrared thermometers to locate the zone between cool and warm waters.

Within 12 days, the oceanographic plane, flying out of Keflavik, Iceland, measured sea-surface temperatures around the entire island to a distance of about 100 miles. The

plane left the Washington, D.C., area on April 1 and returned on the twelfth,



## Scripps 'STYX' Survey Underway

The 180-foot, 825-ton "Alexander Agassiz" sailed from San Diego, Calif., April 2 on the STYX Expedition to the Central Pacific. Investigations are scheduled in the Hawaiian, Samoa, and Society Islands. The vessel belongs to the Scripps Institution of Oceanography, University of California, San Diego.

Dr. William A. Nierenberg, director of Scripps, said the research will cover several phases of deep-sea oceanography--mainly studies of water characteristics, topography, and sediments in the Central Pacific; the past and present animal life on Mid-Pacific sea-mounts and guyots (flat-topped seamounts); and the circulation around oceanic islands.



## U. S. Scientists Investigate North Pacific Polar Front

U. S. scientists are investigating a little-known oceanic boundary that stretches across the North Pacific from Japan to North America. Oceanographers call this boundary between cold Arctic waters and warmer subtropical water the Polar Front.

Scientists have known of this natural phenomenon for about 30 years, but the equipment necessary to study it only became available in recent years.

The study is a joint venture of scientists of the U. S. Department of Commerce's Environmental Science Services Administration (ESSA) and Oregon State University. It is being carried out from the "Surveyor," an ocean-survey vessel of ESSA's Coast and Geodetic Survey.

### 60 Miles Wide

Theodore V. Ryan, Director of ESSA's Pacific Oceanographic Research Laboratory in Seattle, Wash., and the expedition's chief scientist, estimated the Polar Front as 60 miles wide. Seasonal study of the Front was conducted in April 1968. It will be done again in September 1968 and in February of a fu-

ture year. He said the study will cover a 3,000-mile stretch of the North Pacific, midway between the Hawaiian and Aleutian Islands, starting from a point about 1,500 miles west of California. In addition to 3 ESSA scientists and technicians, there are 5 scientists from Oregon State University, headed by Dr. Kilho Park, professor of chemical oceanography. Dr. Park is interested in the chemical properties and processes found at the Front.

### Expedition Purpose

Ryan explained: "One of the purposes of our expedition is to determine what happens to the water at the interface between these two dissimilar water masses. Oceanographers have long recognized that plant and animal life and even weather differ significantly on either side of the boundary. Some very significant changes occur in the waters when they meet. The chemical constituents of the water, such as phosphates, nitrates, silicates, carbon-dioxide concentrations, and many others, show a marked and abrupt change across the boundary. In addition, it isn't clear yet what happens to the resultant water type which is formed by the mixture of the two primary species." Some oceanographers theorize it ultimately sinks to intermediate depths and flows east and south.

Ryan said current meters and photography would be used to study the circulatory patterns at the bottom of the sea. The scientists will attempt to determine the main path of northward flow through the central North Pacific.

The Pacific differs from the Atlantic because the Bering Strait offers a very shallow, narrow passage between the two oceans--and there is no circulation of deep waters between the Arctic and the Pacific.

Ryan noted that one feature of the Polar Front is the distinct difference in weather on either side of the boundary. "The north side of the Polar Front is characterized by overcast skies and strong storm conditions, while the weather below the boundary is generally better."



## Foreign Fishing Off U. S. In March

### OFF ALASKA

**Soviet:** The number of fishing vessels decreased from about 130 in early March 1968 to about 100 at month's end. (In 1967, Soviet fishing and support vessels increased from about 130 in early March to over 150 by the end of the month.)

The Soviets discontinued their Pacific ocean perch fishery in the Gulf of Alaska, reduced a similar fishery off the Aleutians, but continued perch fishing south of the Pribilofs. Flounder fishing in the Bering Sea continued--but on a greatly reduced scale. Herring fishing south of the Pribilofs was discontinued by mid-month. King crab fishing in the eastern Bering Sea was one-third below last year's, but shrimp fishing in the central Gulf of Alaska expanded greatly during the month.

The Soviets fished Pacific ocean perch in 3 general areas: Gulf of Alaska, along Aleutians, and off Pribilofs. In Gulf of Alaska, the few remaining trawlers discontinued perch fishing in late March. (In 1967, they stopped ocean perch fishing there in mid-May.) In the eastern Aleutians, south of Fox Islands, a fleet of 10 medium trawlers and support vessels appeared early in March. Initial catches apparently were good, for by mid-month the number had tripled to nearly 30 vessels. Good catches, however, were short-lived; at month's end, fewer than 10 vessels remained. Most of this fleet moved south to the Pacific Northwest coast for hake fishing. In late March, about 5 stern factory trawlers and medium freezer trawlers moved to the edge of the Continental Shelf south and west of the Pribilofs seeking Pacific ocean perch. This area bisects the Bering Sea from Unimak Pass to Cape Navarin on the Asian mainland. The Soviets have fished perch intermittently for several years with few vessels for a short time.

Flounder fishing vessels in the Bering Sea decreased in number during the month. This fishery was almost at an end in late March, when only about 20 fishery and support vessels remained from about 70 in early March. (The pattern is similar to 1967's, when in late March the Soviets fished for flounder with about 30 vessels, and the fish-

ery ended by mid-April.) Good catches of flounder were observed by BCF agents during one flight, but apparently this was not true for all vessels. Some medium freezer trawlers caught barely 5 metric tons per day and were transferred to ocean perch fishing off Aleutians. Catches of large stern trawlers sometimes were excellent: one vessel landed 1,800 metric tons in 45 days, or about 40 tons per day.

The herring fishery in the Bering Sea, which began on commercial scale in late January, was short-lived. By end of February, ice drifted into area and forced fleet (at its peak 30 vessels) to disband. Some large stern factory trawlers left for ocean perch fishing; others (mostly medium trawlers) went into cod fishing, and some remained on grounds a few days longer despite bad weather and ice because fishing was good. By mid-March, most fishing vessels left; only 3 exploratory research vessels of the Pacific Institute of Fisheries and Oceanography still criss-crossed the herring grounds off Pribilofs studying species to forecast its abundance in next year's season. Most vessels were large stern trawlers and medium freezer trawlers; both classes can freeze catches. Also, the Soviets temporarily used the newly constructed cannery "Aleksandr Kosarev," equipped for herring canning. Good catches necessitated the help of several refrigerated transports to take frozen or salted catches to Siberian home ports.

Pacific cod was taken by the Soviets north of Fox Islands (in eastern Aleutians near Unimak Island) in deeper waters of Bering Sea; this was confirmed by aerial surveillance flights of U. S. Coast Guard and BCF. The initial 12 vessels at end of February increased by third week of March to about 20 medium freezer trawlers; the number again decreased to about a dozen trawlers at end of March.

The king crab fishery in eastern Bering Sea is conducted by only 2 canneries: "Pavel Chebotniagin" and "Konstantin Sukhanov." Each is accompanied by 3 tangle-net setting medium trawlers and an exploratory research vessel. During last few years, the Soviets deployed 3 canneries and 10-11 trawlers for king crab fishing on U. S. Continental Shelf.

Shrimp fishing on Portlock Bank off Afognak Island (in Central Gulf of Alaska) began on limited scale in February 1968. It expanded greatly in March. The 2 medium freezer

trawlers, which were conducting more exploratory than commercial fishing in February, apparently found large concentrations of small Alaskan shrimp. In late March, they were joined by 13 more trawlers and 2 canning and freezing floating factories: "Aleksandr Kosarev" and "Korablestroitel Khlopotov," both recently constructed in Leningrad's Admiralty Shipyards. The two differ from the "Zakharov" class canneries engaged in king crab fishing. They are the largest of their type: 531 feet long. Although built in same shipyard as Zakharovs, this new version has 50 percent greater processing capability and employs 20 fewer persons aboard. Most processing lines are automated. New vessels have 12 processing lines (400 machines), plus special plants to salt fish and boil shrimp. Canning lines are completely automated and can produce 300,000 cans of herring (or 180,000 cans of tuna) each working day. Shrimp apparently are frozen and packed in small packages. A daily production of 40 metric tons of fish meal and fish oil also is possible. In 1967, the Soviets operated only 1 large Zakharov-class mothership with about 20 shrimp fishing medium freezer trawlers. This ratio was not particularly good because the processing facilities of one mothership could not keep up with excellent catches of medium trawlers. As a result, part of catch had to be frozen aboard freezer trawlers, cutting fishing time.

**Japanese:** Typically during early spring, more Japanese fleets arrive on fishing grounds off Alaska. This year, arrivals raised the number of vessels from 45 at beginning of March to about 110 at end.

Gulf of Alaska Pacific ocean perch fishing increased slightly with at least 6 factory trawlers so engaged by mid-March. Five were fishing principally in central Gulf of Alaska from off Yakutat Bay to south of Kodiak Island. The sixth factory trawler worked off southeast Alaska throughout month. About 12 factory trawlers (500 to 3,500 gross tons) fishing principally for ocean perch apparently were operating as independent units. They appeared in increasing numbers along edge of Continental Shelf in eastern and Central Bering Sea. A factoryship was fishing ocean perch along edge of Continental Shelf south of Pribilofs.

By late March, 2 more fleets, believed involving 55 accompanying trawlers--engaged principally in production of minced

fish meat and fish meal and oil--joined a third fleet with 10 trawlers on proved pollock grounds north of Fox Islands.

By mid-month, the usual two Japanese king crab fleets arrived on accustomed fishing grounds north of Alaska Peninsula. One is accompanied by the usual 6 tangle-net handling trawlers; the other has 10 accompanying trawlers. The Japanese say the latter will place greater emphasis on fishing pots for both king and tanner crab this year. Apparently, this accounts for the extra trawler-type vessels with this fleet.

The increased efforts by long-liners in Gulf of Alaska continued through March. Sightings indicated there were at least 3 long-liners active off southeast Alaska, fishing principally for sablefish.

#### OFF PACIFIC NORTHWEST

**Soviet:** During March 1968, 20 different fishing and support vessels were sighted. During first 3 weeks, most were large stern trawlers but, in fourth week, when hake fishing began, 9 medium trawlers moved into waters off Washington accompanied by 3 large processing and transporting support vessels.

Soviets fished off Oregon during most of March (see table) and concentrated their vessels off Grays Harbor (Washington) when hake began to run.

Soviet Fishery Vessels Off Pacific Northwest in March 1968  
(Including Duplications)

Week Ending	Area	Type of Vessel				Total
		Medium Side Trawlers	Stern Factory Trawlers	Support Vessels	Research Vessels	
Mar. 7	Wash. Oregon	-	1	-	-	1
	Total	-	2	-	1	3
Mar. 14	Wash. Oregon	-	3	-	1	4
	Total	-	1	-	-	1
Mar. 21	Wash. Oregon	-	1	-	-	1
	Total	-	5	2	-	7
Mar. 28	Wash. Oregon	-	2	-	-	2
	Total	-	6	2	-	8
	Wash. Oregon	9	1	3	-	13
	Total	2	-	-	-	2
	Total	11	1	3	-	15

Almost no information is available on Soviet catches in this area, but it is believed that most stern trawlers fished for ocean perch and other rockfishes.

Only one fishery research vessel was identified, "SRTM-8450," about 30 miles off Heceta Head in Central Oregon during early March; then she moved south and was sighted off California.

**Japanese:** Three vessels (2 stern trawlers and 1 long-liner) were fishing off Pacific Northwest, all off Washington. But only on the long-liner were fish observed: rockfish and sablefish.

#### OFF CALIFORNIA

**Soviet:** After an absence of about  $2\frac{1}{2}$  months, the Soviets began fishing off California in mid-March with 6-9 stern factory trawlers. Most vessels were sighted in the northern part of California, above San Francisco. During last week, a supply tanker arrived off Point Reyes to refuel fleet.



Fig. 1 - Soviet factory stern trawler "Peter Liziukov" was one of several recently constructed "Atlantik" class trawlers operating off U. S. Atlantic coast in March 1968.

(Photo: Charles L. Philbrook)

Two of the large trawlers were "Atlantiks," a new class of freezer trawler being constructed in East Germany. The first Atlantik deployed in the Pacific was the "Akustik." She began fishing off Pacific Northwest in November 1967, moved off California in December, and by January 1968 was sighted near Baranof Island in Gulf of Alaska. By mid-March, she was again fishing off California, but only for about a week. Then she was replaced by the "Aviator," another Atlantik just off East German construction slips. The new trawlers are being sent fishing directly from shipyards via the Panama Canal; their crews are flown from Far East

to European Russia. They return to their Far Eastern home ports only after maiden trip.

The research vessel "Akademik Berg" (intermittently off California and Pacific Northwest during past 3 months) was sighted on March 21, about 20 miles west of Fort Ross, losing much oil. She was not reported off California later and it is presumed she headed north and possibly home for repairs. She was replaced in fourth week by a smaller exploratory medium trawler, the "SRTM-8450" of Pacific Institute for Fisheries and Oceanography in Vladivostok, whose mission was to find concentrations of rockfish.

#### OFF HAWAII

**Soviet:** The number of vessels fishing 200-300 miles north of the Hawaiian Islands increased to about 12 in first half of March. Catches were good. By end of March, however, the fleet had moved out. The species caught were the families Pacific dories "Zeidae" and alfonsinos "Berycidae." Excellent catches were taken at times: Several trawlers caught up to 70,000 pounds per fishing day several days in a row. The fleet used midwater trawls since ocean depth exceeds 2,000 fathoms.

#### OFF U. S. TRUST TERRITORIES

**Soviet:** It is believed the 4 medium trawlers tuna purse-seining off Caroline Islands are continuing.

#### IN GULF OF MEXICO AND OFF SOUTH ATLANTIC

No foreign vessels were sighted fishing off the U. S. Atlantic coast south of Cape Hatteras (including Florida coast) or off U. S. Gulf of Mexico coast.

#### IN NORTH ATLANTIC

An estimated 170 foreign fishing vessels from the USSR, Poland, and Spain fished. Soviet vessels were most numerous; weekly sightings showed sharp increases from about 50 early in month to over 100 by month's end. In all, 125 individual vessels were sighted.

Twelve Polish vessels (2 stern trawlers, 9 large side trawlers and 1 factory base ship) and an estimated 30 Spanish pair trawlers also were sighted.

Widespread and frequent shifting of fleets between Georges Bank and Middle Atlantic occurred. As a result, surveillance flights were coordinated with both the First and Third Coast Guard Districts.

#### IN NORTHWEST ATLANTIC

**Soviet:** Early in month, only 5-6 Soviet vessels were scattered from south of Block Island, R.I., to eastern slopes of Georges Bank. By mid-month, a group of 12 stern trawlers was 60 miles south of Block Island. Moderate catches on board appeared to be red hake. Near month's end, a fleet of 47 Soviet vessels (mostly medium trawlers) was about 55 miles south of Martha's Vineyard. Moderate catches of herring were observed on board.

#### OFF MID-ATLANTIC

**Soviet:** Through March, large fleets fished primarily off New York and New Jersey. Early in month, 50-60 vessels were located southeast of Cape May, N.J.; mid-month, nearly 100 vessels. These were west of "no fishing" zone south of Long Island. Heavy-to-moderate catches observed on board were primarily herring.

The Soviets made good use of loading zones off Moriches Inlet, L.I., and Atlantic City, N.J. Once, 21 vessels (including several giant 15,000-gross-ton processing ships)

were crowded into small loading zone off Long Island. The loading zone apparently was too small and several vessels were sighted in adjacent 9-mile contiguous zone. The Coast Guard notified Soviets they were within U.S. 12-mile zone--and their vessels departed immediately for high seas.

**Polish:** 5-6 vessels were seen fishing off southern New England and New York, frequently within "no fishing" zone. Catches were primarily herring. One Polish trawler, illegally anchored inside U.S. 12-mile limit, was so advised by Coast Guard of the violation and returned to high seas.

**Spanish:** An estimated 30 Spanish pair trawlers (see fig. 2) fished on eastern slopes of Georges Bank. These received attention in response to New England fishing industries' concern over the discarding of haddock witnessed by U.S. fishermen. It appears the Spaniards want large fish (cod) only and wash smaller fish overboard (see fig. 3.)

#### SOVIET VIOLATIONS OF U.S.-USSR MID-ATLANTIC EIGHT FISHERIES AGREEMENT

In March, 13 violations of the Agreement involving 13 individual Soviet vessels were observed. Eleven cases involved both trawlers and support ships anchored illegally outside the authorized loading zones. Two Soviet side trawlers were observed fishing within "no fishing" zone.



Fig. 2 - Spanish "Pareja" trawler fishing on eastern Georges Bank in Feb. 1968.



Fig. 3 - Harvesting cod by Spanish "Pareja" trawler on Georges Bank in Feb. 1968.  
(Photos 2 & 3: Ralph C. Levie)

#### BOARDINGS OF FOREIGN VESSELS IN NORTH ATLANTIC

The Soviet repair tug "Uragan" towed factory stern trawler "Pallada" into Boston Harbor on March 2, 1968. The Pallada had nets caught in her propeller while fishing east of Cape May, N.J. Because of an approaching storm, permission was granted to enter protected waters of Boston Harbor. Both vessels were inspected by BCF Resource Management Agents.

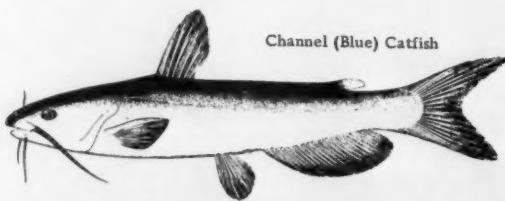
The Polish trawler "Brda" entered a Philadelphia shipyard for boiler repairs on March 11, 1968. The vessel remained several days and was boarded by a Resource Management Agent.

The Soviet water tanker "Buguruslan" received permission to enter Philadelphia port on March 26, 1968, to load 700 tons of water for fishing fleets off U.S. Atlantic coast.



#### THE CATFISH

Fifty million pounds of farm-raised catfish are expected to be harvested in 1970, and this will double again by 1972. The current average yield is 1,000 pounds per surface acre. More efficient operators obtain yields of 1,500 to 2,000 pounds per acre. In experimental trials, yields of 7,000 pounds per acre have been achieved. In any case, there is a good possibility that in the next 10 years the harvest of commercially cultured catfish alone will exceed commercial catches of all wild species in the Great Lakes.



Channel (Blue) Catfish

Recent development of a mechanical dressing and skinning machine has greatly facilitated processing operations. Farm fish producers have formed processing and marketing organizations. Outside capital has been invested in catfish farming with an eye toward integrated production-processing-marketing procedures. An un-filled demand exists for the highly

esteemed catfish in its traditional market area in the south-central United States. The succulent, white, meaty fillets and steaks from catfish are ideal for producing more products for new market areas.

The stage is set for commercial fresh-water fish farming to make a major contribution to the food resources of the United States. We in the Bureau of Commercial Fisheries are pleased to have contributed to the development of the blossoming industry. We expect to contribute even more significantly in coming years through research and technical assistance.

## STATES

### California

#### 1967 ANNUAL REPORT ON FISH AND GAME ISSUED

In 1967, California's commercial fishery landed about 589 million pounds worth \$77,000,000. The landings were below those of recent years. Tuna made up about half the 1967 landings. This was disclosed by Walter T. Shannon, Director, California Department of Fish and Game in his 1967 annual report.

The crab harvest was 10.6 million pounds, a slight rise from 10.4 million in 1966. Most were taken in northern California; only 390,000 pounds were landed in the San Francisco area. However, Shannon stated, 1967-68 is expected to be much better, "with some 2 million pounds being taken in the San Francisco area."

Shrimp landings were 1.5 million pounds; 1968's landings should be about the same.

#### Anchovy

Last season's reduction fishery landed 37,615 tons of anchovy; the live-bait fishery landed 6,691 tons. The Fish and Game Commission set a quota of 75,000 tons for the third experimental anchovy reduction season (1967-68). It was the same as the past 2 years.

#### Albacore Research

Research on albacore revealed that "the backbone of the fishery" are the 2- and 3-year-old fish. Shannon stated: "This means that the fishery could survive one weak year class but would be in trouble with two weak year classes in a row." His department has the knowledge "to predict this sort of thing before it happens."

#### Shrimp Surveys

Shrimp surveys show that the 1967 year class is one of the weakest in a dozen years. "We shall have to be careful not to over-harvest shrimp in 1969," Shannon emphasized.

#### Salmon and Steelhead

In 1967, commercial salmon landings were 7 million pounds; they were 9.7 million in

1966; the 10-year average was 7.4 million. Salmon and steelhead spawning runs are below average, especially in Sacramento and American Rivers.

The State planted more than a million silver salmon in north coast streams in 1966-67. It released the first yearling king salmon in the San Joaquin system. It will stock 200,000 kings a year in this system in an attempt to restore the once-great runs.



### Alaska

#### COAST GUARD AND BCF WRITE SAFETY BOOKLET FOR FISHERMEN

The U. S. Coast Guard and BCF have co-authored "Safety Notes for the Alaskan Fisherman." The authors note the urgent need for the publication: "Alaska has the unenviable distinction of having the worst water safety record of any state in recent years. Furthermore, a large percentage of Alaska's grim statistics are from the commercial fishing industries."

During 1966 and 1967, 99 commercial fishing boats over 20 feet long were lost. Nearly 1,800 accidents involving fishermen occurred. In 1966, 60 fishermen perished.

The booklet will be made available to Alaskan fishermen. A. K. Larssen of BCF's Alaska Region Exploratory Fishing and Gear Research Base worked closely with the Coast Guard in preparing it.

#### What Booklet Covers

Through case history, hypothetical case, photo and cartoon, the easy-to-read booklet throws a lifeline to the fisherman.

In "Saga of the F/V Highliner," a story fashioned to instruct, the authors tell how a skipper in crisis should have handled the situation. Its theme: "'When the water gets over your knees'--that's the time you should have already called for help! Many boats and lives have been lost from waiting too long before signalling for assistance."

A chapter entitled "Brass Tacks" reports that "the most frequent difficulty experienced by Alaskan fishing vessels is trying to occupy

a space already filled--by a rock! Although some rocks may not be charted properly, the vast majority of those which have been struck are properly charted!" It provides advice to keep the fisherman "in good shape."

The booklet contains safety information concerning fire, overloading, icing, weather, collision. An indispensable chapter to fishermen is "When All Else Fails"--the problem of survival.

The booklet also covers the daily routines--and injuries--of handling fishing gear and marine equipment.

\* \* \*

#### UDALL CONDEEMS WATER POLLUTION CAUSED BY OIL OPERATIONS

To contend with the increasing water-pollution incidents caused by oil exploration in Alaska's Cook Inlet, Interior Secretary Stewart L. Udall has asked industry to cooperate in an emergency control program and in setting strict industry guidelines.

Secretary Udall said: "During recent months, I have received well-substantiated evidence that exploration and development activities in Cook Inlet have resulted in a recurring series of pollution incidents. Between June 1966 and December 1967, there were some 75 incidents of oil pollution in Cook Inlet reported by Federal and State Agencies responsible for the conservation of the natural resources of the area."

He added that pollutants included crude oil, mud sacks, garbage, refuse, engine oil, stove oil, and jet fuel. Some progress has been made in talks with industry officials, he noted, but the basic problem remains.

Secretary Udall cited as examples the damage sustained in commercial fishing with oil fouling nets and fish taken in nets. Also, 1,800 to 2,000 ducks were killed by one oil spill. In December 1967, a tanker colliding with a dock caused an oil spill of more than 1,000 barrels of oil over 20 miles.

#### Concerned About Future

Secretary Udall said: "I am concerned not only about the pollution problem in Cook Inlet but have even greater concern about the possibilities of similar consequences from the

forthcoming exploratory and development programs in the Gulf of Alaska and Bristol Bay.

"Those areas are of even greater importance to commercial fisheries and wildlife. In fact, nowhere else on the North American Continent does the prospect of pollution from oil development pose such overwhelming threats to birds and other wildlife and to fishery resources."

Secretary Udall said he could not over-emphasize his concern for the safety of fish and wildlife resources in the years ahead: "One gusher, one wrecked tanker, one broken pipeline, or one large spill--accidental or not--could cause lasting damage. In fact, no oil exploratory or development work should start in Bristol Bay until the industry can assure that its operations will be carried out without polluting the environment and without damaging fish and other aquatic resources."

\* \* \*

#### SET QUOTAS FOR HERRING-SPAWN-ON-KELP FISHERY

During the past few years, the Alaska fishery for herring-spawn-on-kelp has grown to a \$750,000 dollar business, reports BCF Juneau. This fishery occurs for a few minutes to a few hours at 3 places in southeastern Alaska. The kelp, with its burden of spawn, is picked by hand from small boats. It is dry salted in barrels for export to Japan. Competition is very intense because the price paid to fishermen may be \$1 or more per pound and processing is very simple.

This year, new regulations require fishermen to register for a single area. A quota is set for each fisherman depending on the total number of registrants. These actions have reduced the "gold rush" atmosphere. However, it did not reduce significantly the number of fishermen or processors.



#### Oregon

#### COHO SALMON RELEASES COMPLETED

The Oregon Fish Commission completed its annual coho salmon releases in April. Its hatcherymen released from 9 coastal and Columbia River hatcheries 8.7 million coho smolts, young fish ready to begin their seaward migration.

In addition to the smolts, which are fed in the hatcheries for about 14 months, more than 7 million small, unfed, coho were released. Most of these smaller fish went into Willamette River tributaries where the commission is attempting to develop a large coho run.

#### Spectacular Coho Season

The coho releases completed one of Oregon's most spectacular coho seasons. Sport fishing the length of the coast was the best ever; a record 300,000-plus coho were caught at the mouth of the Columbia. The ocean troll fishery landed a record 8.3 million pounds. The Columbia River gill net catch of 3.8 million pounds was the second highest since 1929.

Despite these record and near-record harvests, about 26,000 adult coho were hauled from commission hatcheries in tank trucks of the Fish Commission, U. S. Fish and Wildlife Service and Oregon Game Commission, and released into streams with natural spawning potential.

Another 92,000 returning coho were sold to commercial processors on bid. About 25,000 were provided to state and county institutions for food programs.

#### 36 Million Eggs Taken

Commission hatcherymen took 36 million coho eggs. Eleven million were given to other fisheries agencies, including the Oregon Game Commission, U. S. Bureau of Sport Fisheries and Wildlife, and the Idaho, Montana, Alaska, California, Michigan, New York, and Minnesota conservation departments.

Eighteen million coho eggs were retained at Fish Commission hatcheries. The recent fry releases came from this stock. The remainder are being reared at the hatcheries. After culling and natural mortalities, about 10 million smolts will be released in early spring 1969.

\* \* \*

#### NEW DAM THREATENS CHINOOK RUN

Oregon Fish Commission director Robert W. Schoning said in April that no commercial fishing season for spring chinook in the Columbia River would be considered in the immediate future unless the prevailing fish passage situation at John Day Dam were drastically reversed.

The season was to remain closed until further notice. Without such action, the commercial season would have begun on April 27, the same as in 1967.

The Washington Department of Fisheries in the second half of April, closed sport fishing for spring chinook in the Columbia for Washington fishermen; the Oregon Game Commission closed it for sport fishing on the Columbia in Oregon. The Washington agency also delayed opening the commercial fishery on the Columbia until further notice.

#### Fish Passage Problems

Schoning said that he was expecting a relatively small run of spring chinook this year, and that those in the river already were experiencing extreme passage difficulties. The problem was caused by the newly completed John Day Dam between The Dalles and McNary Dams. The fish were not moving over the fishway at the new dam in satisfactory numbers.

Bonneville, the lowermost dam on the river, is 145 miles above the mouth. The Dalles Dam is 46 miles above Bonneville; the John Day Dam is 24 miles further upstream; McNary is 67 miles above Day.

The count at Bonneville of chinook moving up the ladders was over 59,000 fish through April 25. At The Dalles Dam, the count also was encouraging: 2,800 chinook over on the 25th for a season total of 33,000. But, Schoning stated, John Day Dam counts were extremely alarming--a total of only 1,620 chinook through April 25.

Although some time lag between passage at the dams was expected, something was drastically wrong at John Day Dam: thousands of fish that successfully negotiated The Dalles fishways were held up.

#### Corrective Measures

Oregon Fish Commission and Washington Department of Fisheries biologists and engineers worked closely with the Corps of Engineers to adjust fish-passage facilities. The number of chinook passing John Day increased somewhat later in April--but was still far below normal.

\* \* \*

## NEW FISH-MARKING METHOD APPROVED

A new method of marking hatchery-reared salmon by causing fluorescent rings to form in their bones has been approved by the U. S. Food and Drug Administration, reports Dr. Thomas E. Kruse, Oregon Fish Commission research director.

The technique mixes the antibiotic oxytetracycline into the food of young salmon being reared in the hatchery. A small amount is enough to lay down an identifying mark in the bones. When examined under ultraviolet light, the mark appears as a fluorescent yellow band that stands out clearly against the bluish background of "normal" bone.

### Method's Advantages

Among the method's advantages is that it does not handicap the fish, as may happen when fins are clipped or when metal or plastic tags are used. The oxytetracycline technique is also cheaper than other methods and does not require handling of the fish with the possibility of injuring them. Experiments have shown that more than one ring can be produced in the fish by feeding of the marking agent at intervals.

### Flourescent Mark

To examine fish for the flourescent mark, a bone sample must be taken. A segment of backbone from the tail end is ideal. This is a relatively simple matter when adult salmon return to the hatcheries on the spawning run. The fish are dispatched prior to spawning, and there is little problem in removing a bone sample with a special bit mounted in a drill press. At fish-processing plants, bone samples should also be readily available since the tails are cut off and discarded in preparation of the salmon for canning.

Sampling the sport catch for the mark is different. Biologists have designed a special tool to remove a bone from the inside of the mouth. This does not mutilate the fish as removal of a section of backbone would. It should overcome any objection many fishermen would have to their catch being somewhat mangled--even for science.

Initial work in marking fish by feeding oxytetracycline was done by Douglas Weber and George Ridgway of BCF Seattle. The refinements in method and technical work

necessary to win Food and Drug Administration acceptance were made by an Oregon Fish Commission crew under biologist Irv Jones of the Clackamas research laboratory staff.

Fisheries workers believe the new technique will measure more accurately the contribution of hatcheries to sport and commercial fisheries.



## Washington

### AQUARIUM FACILITY TO BE BUILT ON PUGET SOUND

The Oceanographic Commission of Washington State has appointed a committee to select a site and carry out the design, construction, and operation of a major aquarium facility on Puget Sound in King County. The new committee began work on May 7.

The sum of \$3,000,000 in county general obligation bonding authority is available for the proposed aquarium. The County of King will contract with the Oceanographic Commission of Washington (OCW) and its State nonprofit corporation, the Oceanographic Institute of Washington to build and operate the facility.

### Both Research and Entertainment

OCW members say that the proposed aquarium will be a modern mixture of public viewing and entertainment areas, working fisheries and oceanographic research facilities, many open to public--and a working tool of all State educational levels from secondary to university.

The committee has representatives of the Oceanographic Commission of Washington, University of Washington, State of Washington Departments of Fisheries, Fish and Game and Parks and Recreation, the City of Seattle, King County, U. S. Bureau of Commercial Fisheries, the Pacific Science Center, and Virginia Mason Research Center.



## Massachusetts

### BOSTON HARBOR POLLUTION CONFERENCE CALLED

Pollution in the Boston Harbor area has required closing more than 1,000 acres of shellfish beds, Secretary of the Interior Stewart L. Udall has announced. The halt in clam harvesting is causing an estimated annual loss of \$256,000 to \$1,400,000 a year. The shellfish beds were closed by Massachusetts because of bacterial contamination in the harbor waters.

The greatest source of water pollution in Boston Harbor is the discharge of municipal waste. About 460 million gallons a day of raw or partially treated sewage from the metropolitan area are discharged through 2 major sewerage systems.

More pollutants are discharged into the harbor and its tributaries from boats, other water-pollution control plants providing inadequate treatment, and overflows from combined sewers carrying sewage and storm water.

The waste produce bad odors, stimulate excessive growth of aquatic plants, and make it dangerous to use the waters for swimming and boating.

#### Udall Calls Enforcement Conference

Sec. Udall has called a Federal-State enforcement conference in Boston on May 20 to cope with the pollution problem. He acted under a provision of the Water Quality Act of 1965. The provision gives him authority to start an enforcement action when he finds that substantial economic injury has been caused by inability to sell pollution-damaged shellfish in interstate commerce.

Representatives of Interior Department's Federal Water Pollution Control Administration and Massachusetts will attend.

\*\*\*

### COMMERCIAL FACTORY TO PRODUCE FPC IS DEDICATED

A commercial plant to produce fish protein concentrate (FPC) was dedicated at the end of April in New Bedford, Mass. Governor John Volpe stated that the product "can give new employment and strong new hope to our lagging industry." Some observers saw its major significance as a potential lifeline for the world's hungry millions.

The Alpine Geophysical Associates plant will grind whole fish and extract their oil and water. It is reported that the remainder will have a pure animal protein content of more than 80 percent.

\*\*\*

### BOSTON POND HAS TROUT FISHING

The fisherman on 63-acre Jamaica Pond in Jamaica Plain, Boston, can hear the sounds of the vibrant city and see a large apartment building to the north. But his attention is concentrated on the rainbow, brown, and brook trout--and the largemouth and smallmouth bass. The pond is within the Boston parks system.

Jamaica Pond is one of several city-surrounded trout-waters in the Northeast District of the Massachusetts Division of Fisheries and Game. Some others are: Plug Sound and Round Pond in Haverhill, Dug Pond in Natick, Forest Lake in Methuen, and Woburn's Horn Pond.



### CORRECTION

In "Mass Culture of Pink Shrimp and Pompano Studied by Miami U," April CFR, p. 13, a sentence in paragraph "Use of Warmed Water?" should have read: "When the cooling water is pumped out, it has increased in temperature by about 10° F."

# ARTICLES

## TRENDS IN THE ATLANTIC SEA SCALLOP FISHERY

By Julius A. Posgay\*

Great changes have occurred in the Atlantic sea scallop fishery during the past 10 years. New boats for this fishery have been built in Canada; the U. S. fleet has declined. At first, landings went to unprecedented high levels but lately have declined. Prices dropped in the face of abundance, recovered, then rose dramatically when abundance declined moderately. This article explains the changes.

As recently as 10 years ago, the Atlantic sea scallop fishery was almost a monopoly of the U. S. Landings in 1957 were about 24 million pounds of meats, 88 percent of which was landed in U. S. ports by U. S. vessels. By 1962, landings had risen to 38 million pounds, but only 63 percent was made in the U. S.; the rest was landed in Canada. During 1966, landings were about 34 million pounds, and the U. S. share had dropped to 47 percent (table).

the fishing grounds. This rose to 16,000 in 1962 and 17,000 in 1966. What has changed is the relative amount of effort put in by fishermen of the two countries. The percentages are almost the same as those for landings: in 1957, 87 percent of the effort was contributed by the U. S.; in 1962, 68 percent; and in 1966, 47 percent (table). As Canadian vessels entered the fishery, U. S. vessels dropped out.

Landings of Sea Scallop Meats (Millions of Pounds); Effort (Thousands of Days Fished); Landings Per Day Fished, L/E (Hundreds of Pounds); and a Research Vessel Abundance Index (AVAI) for Georges Bank

Area and Item	Years							
	'45-'59	'60	'61	'62	'63	'64	'65	'66
Subarea 4: Landings Effort (Can.)	1.0 1/0.6	0.2 1/0.2	0.4 1/0.3	1.4 1/0.5	3.2 1/1.5	2.8 1/1.4	2.0 1/1.2	1.2 1/0.5
Subarea 5: Landings Effort (U. S.) Effort (Can.) L/E R.V.A.I.	14.0 8.2 0.6 17 N.A.	29.4 8.0 2.3 29 112	33.7 8.7 3.1 29 92	34.4 9.1 4.6 25 98	30.6 7.7 5.9 22 46	26.6 6.7 6.7 20 40	13.8 2.0 5.7 18 34	11.1 1.1 5.5 17 48
Subarea 6: Landings Effort (U. S.) Effort (Can.) L/E	4.3 1/2.8 0.0 N.A.	2.8 1/1.4 0.0 N.A.	2.9 1/1.4 0.0 N.A.	2.2 1.8 0.0 12	1.7 1.1 0.0 15	2.0 1.2 0.0 17	23.6 7.6 1.8 25	19.8 6.9 2.3 22
All areas: Landings Effort (U. S.) Effort (Can.) Total effort L/E	19.3 1/11.0 1/1.2 1/12.2 16	34.3 9.4 2.5 11.9 29	38.0 10.1 3.4 13.5 28	38.0 10.9 5.1 16.0 24	35.5 8.8 7.4 16.2 22	31.4 7.9 8.1 16.0 20	39.4 9.6 8.7 18.3 22	34.1 8.0 8.3 16.3 21

1/Estimated.

N.A. = not available.

Fishing effort has only increased about 10 percent during the past 10 years. In 1957 the total amount of effort was 15,300 days on

Only about 10 percent of the Canadian catch is consumed in Canada. The rest is sold in the U. S. (fig. 1).

\*Fishery Biologist, BCF's Biological Laboratory, Woods Hole, Mass. 02543.

U. S. DEPARTMENT OF THE INTERIOR  
Fish and Wildlife Service  
Sep. No. 814

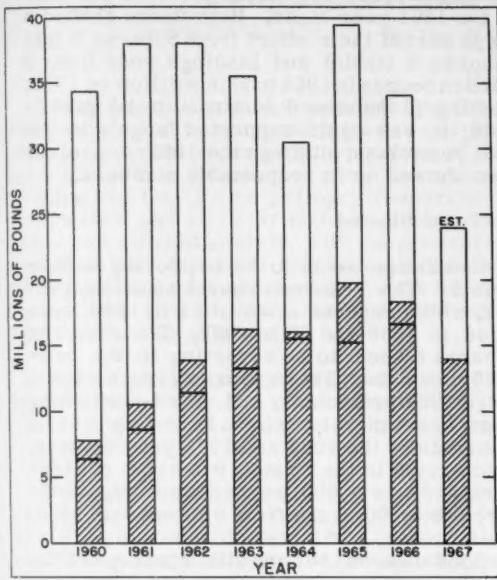


Fig. 1 - Annual landings of sea scallop meats 1960-67. The unshaded parts of the bars show United States landings and the shaded parts Canadian landings. The portion of the Canadian landings below the horizontal line in each bar shows the amount that was exported to the United States in that year.

### The Fishing Grounds

The sea scallop grounds extend from the Gulf of St. Lawrence south to the waters off the Virginia Capes (fig. 2). U. S. vessels have never fished the northern grounds and, until 1965, Canadian vessels had never fished the southern grounds. These northern (ICNAF Subarea 4) and southern (ICNAF Subarea 6) grounds have a history of providing only a small fraction of the total landings. During the years 1945-64, about 80 percent of the landings came from Georges Bank (ICNAF Subarea 5).

### Abundance

One should not regard Subarea 4 and Subarea 6 during the years before 1965 as containing large unexploited stocks of sea scallops. Both areas have extremely active otter trawl fisheries, and any news of good concentrations of sea scallops noticed by these vessels soon reaches the scallop fishermen. In addition, occasional surveys have been made by research vessels in Subarea 4 by Canada, and in Subarea 6 by the U. S.



Fig. 2 - Chart of the ICNAF Subareas along the range of the sea scallop.

These investigations, as well as the analysis of the commercial landings from these areas, have all shown the same general situation. Wherever concentrations of sea scallops were found, they were less dense and covered a smaller area than those on Georges Bank and, almost invariably, they were composed of scallops of a single year class. The consensus has been that these grounds received only occasional spat fall and were of low productivity compared with the Georges Bank grounds.

The average annual landings per day spent on the fishing grounds ( $L/E$ ) shown in table is not a good measure of abundance. It does not take into account the discards, the size com-

position of those kept, or the amount of time spent actually fishing--as compared to that spent shucking. It is, of course, a good measure of the relative success of fishing in one year compared with another, and on different grounds in the same year.

Georges Bank in Subarea 5 has been the most intensively fished sea scallop ground, and hence the most intensively studied. Until 1959, these grounds supplied about 19 million pounds of meats per year in about 12,000 days of fishing. About 10 percent of the effort was Canadian.

In late 1959, the true abundance of sea scallops on Georges Bank increased sharply because of the recruitment of the 1955 year class to marketable size. We have no precise quantitative idea of even the relative abundance of this year class as compared with other year classes, but fishermen with over 20 years of experience said that they had never seen anything like it.

Scallop catch rates immediately rose sharply. Boats that had been reporting landings of about 1,700 pounds per day began to report 3,500 and even 4,000 pounds. The high average catch rate of 2,900 pounds per day on Georges Bank continued during 1960 and 1961. It was at this time that the Canadian offshore scallop fleet began to expand (see table), partly as a result of the extremely good fishing--but also because of economic, social, and political factors in Canada.

Since 1959, annual recruitment has been nearer "normal" levels, with perhaps even a few very poor years. Our estimates of pre-recruits are not good; small scallops do not seem to be available to any of the sampling gear we have tried. The abundance index of our research vessel--the number of scallops larger than 70 mm. taken per 10,000 square feet dredged--declined from 112 in 1960 to 34 in 1965. Catch-per-day figures declined similarly.

An unprecedented increase in abundance of sea scallops appeared in Subarea 6 in 1965. Samples from the commercial landings were

composed almost entirely (over 95 percent) of the 1961 year class. Both fleets shifted a large part of their effort from Subarea 5 into Subarea 6 (table) and landings rose from 2 million pounds in 1964 to 23.6 million in 1965. Fishing in Subarea 6 continued to be good in 1966; it was again supported largely by the 1961 year class, although the 1962 year class also showed up in respectable numbers.

#### 1967 and Beyond

Conditions seem to be improving in Subarea 5. The research vessel abundance index, which reached a low of 34 in 1965, rose to 48 in 1966 and 63 in 1967. The stocks of Subarea 6 seem to be reverting to the pre-1965 condition. There is no evidence of a large 1963 year class, and vessels fishing there seem merely to be cleaning up the remnants of the 1962 and 1961 year classes. Catch rates in the first 9 months of 1967 were down to 1,600 pounds per day, compared to 2,100 in the first 9 months of 1966.

Good data on 1967 are still scarce, but the data available seem to indicate that total landings in Subareas 5 and 6 will be about 24 million pounds--about 10 million landed in the U. S.--compared with 34 million in 1966. About half the trips covered by interview through October 1967 still reported fishing in Subarea 6, but it was likely that most would shift their efforts back to Subarea 5 in the latter part of the year.

The size of the Canadian fleet seems to have stabilized, but there is no evidence that it will decline much. It is difficult to predict what will happen in the U. S. fleet. One reason for its decline has been the high abundance and good prices paid for yellowtail flounder; a second may be a shortage of men. Flounder fishing requires only 5 or 6 men, but scallopers need at least 11. Many boats that converted to flounder fishing might have been expected to go back to scallop fishing when the exvessel price rose. They may not be able to find the extra men, however, or the present low catch rates might discourage them--unless exvessel prices remain at the high levels of early 1968.



## COMPETITION FOR AQUATIC ENVIRONMENT

By Dr. Roland F. Smith\*

Every day millions of Americans find their existence a little more complicated and unpleasant--even endangered--because of the direct or subtle effects that come from competition for the three primary resources--land, water, and air. Our technologically oriented and affluent society, with its pressures and demands on natural resources, has drastically changed many environments beyond recognition and, in some cases, to the very limits of human tolerance.

Quite literally, every corner of this country has been subjected to environmental change, much of it not even anticipated only two decades ago.

Because of environmental loss and degradation, and because of the many demands for specific environments and their associated resources, there will not be enough of some space and some resources for all. Indeed, our commercial fisheries are already affected by the competition that results--competition for environmental quality, space, and for the fish themselves.

Our high seas fishing fleets find competition from other nations increasing each year and, more recently, even our traditional coastal fisheries are being threatened. As critical as this competition may be, generally speaking, we have been more successful in compromising our conflicts with foreign fishing nations than we have been in solving problems at home.

### Competition for Estuarine Areas

Nowhere is competition for environment and associated resources more acute than in our estuarine areas. These are most threatened by population pressures and technological advances. Their fate has been one of steady deterioration and destruction. Relatively few people fully comprehend how vital our estuarine areas are to the Nation, how varied and complex are man's activities here, nor what their total impact is on the economic and social lives of our people.

\*Assistant Director for Biological Research, BCF. Presented at meeting of National Canners Association, Atlantic City, New Jersey, Jan. 22, 1968.

Estuarine areas are bounded by land on the one side and ocean on the other. Their exact boundaries are difficult to delineate for they are a complex blending of earth, air, and water; they are a continuous band--a buffer zone--around our coasts, sometimes extending for hundreds of miles either into the land or the ocean. They constitute a variety of environmental systems in a complex interrelationship we are only just beginning to understand. Most of these estuarine areas are extremely productive of a variety of life. They exceed by severalfold the organic production in the richest of farm lands because they are a remarkable system for the containment and efficient utilization of the essential building blocks of organic matter--minerals, water, and sunlight. Ironically, the very forces which make estuaries such efficient nutrient traps also make them effective silt traps and giant septic tanks.

The Bureau of Commercial Fisheries is interested in estuarine areas because about 65 percent of our commercial fishery resources, by volume or value, consist of species which spend at least a portion of their life cycle in the estuarine environment. They support 7 of our 10 most valuable commercial fisheries. Among the 9 important groups of species which are canned, 6 are dependent on the estuarine environment.

### Estuaries Produce Significant Amount of Oxygen

Incidentally, there may be a more compelling reason for preserving our estuarine areas than that of providing seafood, recreation, hurricane protection, and natural beauty--as important as these may be.

Scientists are becoming increasingly concerned about the rate with which we are using up oxygen in our atmosphere. Indeed, recent estimates suggest that if man is to survive on this planet he will soon have to stop burning fossil fuels. Nearly all of the oxygen in our atmosphere is produced by plants through

photosynthesis. It is estimated that perhaps as much as 70 percent of this oxygen is produced by microscopic plants (plankton) which live in the ocean.

A recent estimate suggests that the United States is using up more oxygen than our land mass is producing. This means that the United States is already dependent on oxygen being produced by marine plants or on other land masses. A significant amount of oxygen produced in the world oceans may come from estuarine and coastal waters. If we destroy the natural systems that permit such abundant marine plant growth, we may be seriously reducing the total world production of oxygen.

With all these demands on the Nation's coastal and estuarine systems, it is not surprising that they have become arenas where many of our basic philosophies and social institutions clash--where national, State, local, and private interests continually battle for recognition and control. However, there is increasing evidence that the public is getting fed up with the rampant environmental decay and rape of these valuable areas. Responsible administrators, scientists, and legislators are showing increasing concern with confusion that leads only to more chaos. The mass dissatisfaction that this reflects and amplifies may slowly help to evolve a public ethic and a recognition of the need for changes in philosophy and in governmental structures and responsibilities. Certainly, in the face of accelerated demands on coastal areas, we must consider how they can be better managed. But, who is to decide how a given area will be used? And how do we apportion the needs of the many competing and conflicting uses?

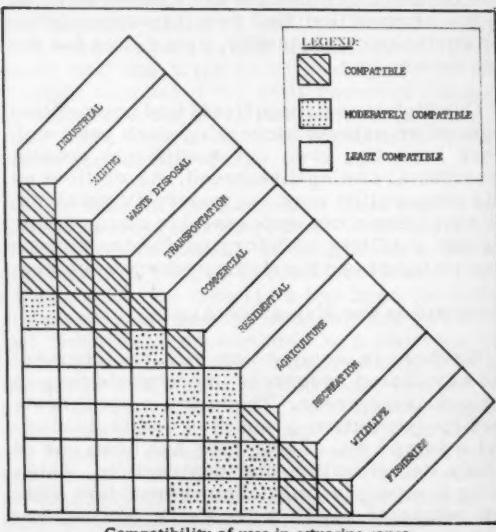
Ultimately, many estuarine areas will be administered as regional units, possibly as parts of large river basin complexes. This concept is gradually becoming recognized as perhaps the only logical approach to sound management of coastal areas. Zoning, in time or space, will become a common practice in most estuarine systems.

#### Impact On Commercial Fisheries

How may we expect our commercial fisheries to thrive under a more controlled and intensified management of estuaries and coastal areas? Surely this will be more acceptable than no controls or uncoordinated local actions. However, the problem of justi-

fying the continued existence of specific commercial fisheries will be increasingly difficult in many areas in the face of uses with higher economic or social values. Commercial fishing interests must recognize that they are going to have a tough selling job in many cases. Promotion programs should not only be designed to sell fish, but to sell the public on how they stand to gain by supporting a strong commercial fishery in coastal areas.

Commercial fishing interests must work actively not only with those whose uses of estuaries and coastal areas are compatible, but to willingly seek for compromises with those whose uses may be only moderately conflicting. By joining forces with recreationists, nature lovers, hunters, sports fishermen, planning groups, civic associations, and even waterfront home owners, we have allies with many common goals (see Figure). Thus, we represent a much stronger force against those who would seek to completely destroy our valuable estuarine living resources. There are many excellent examples of how industry support, even leadership, can be especially effective at the local and State levels.



#### Responsibilities of U. S. and States

A primary role of government--State and Federal--is to determine what we have, what it is worth, and how we can take care of it. Those agencies with responsibilities for man-

agement of estuarine fishery resources have specific responsibilities, which collectively include 7 major areas of effort:

1. Inventory all estuarine areas showing their condition and potential for supporting valuable fishery resources, what is happening to such areas, how they are being threatened, and what estuarine-associated fishery resources are present.
2. Acquire more specific knowledge about the life histories and environmental requirements of estuarine-dependent species.
3. Expand fundamental research in estuarine systems to include studies in productivity, hydrology, nutrient circulation and transfer, species interaction, and biological indicators of environmental change.
4. Develop a sound basis for determining the economic benefit from natural estuarine areas and their living resources.
5. Eliminate institutional barriers that prevent sound and equitable management of estuarine areas.

6. Develop sophisticated techniques to predict effects of proposed environmental alterations on fishery resources.

7. Develop more sophisticated estuarine husbandry programs, including techniques for increasing fish production by alteration of currents, mitigating effects of environmental alterations, controlled use of water products, control of diseases and predators, and development of genetic studies more suited to moderately disturbed habitats.

Generally speaking, efforts to date have not been adequate, but the problem has been recognized and some effective programs are underway. I am convinced that with increased knowledge, and supported by informal public opinion, we can maintain and perhaps even increase production of estuarine fishery resources. I am also convinced that commercial fishermen can compete effectively for many of these resources, and commercial fishing will be an integral part of most plans for managing coastal areas.



#### ANTARCTICA'S MICROBIAL LIFE

Studies of Antarctica's microbial life are expected to provide information useful in developing life detection equipment for automatic landing devices planned for Mars.

Life in the form of algae and bacteria has been located in a dormant stage at temperatures as low as  $-47^{\circ}$  F.

These microorganisms, dormant during the winter months, have been discovered about a foot beneath the surface in the volcanic soil of Antarctica's ice-free Taylor Valley. They become active only with the summer flow of run-off water from the glaciers located in the mountains above the valley. Algae, which require sunlight as their source of energy, are believed to exist in a dormant stage at temperatures below  $-60^{\circ}$  F. (Reprinted with permission from "Science News", weekly summary of current science, copyrighted 1966 by Science Service, Inc.)

## U. S. AND JAPAN CONDUCT SALMON RESEARCH IN COOPERATIVE CRUISE

By Robert R. French\*

The Bureau of Commercial Fisheries (BCF) and the Japanese Fishery Agency have pooled their resources in a cooperative research cruise underway this spring in the North Pacific Ocean. The two nations and Canada are treaty members of the International North Pacific Fisheries Commission (INPFC). Each signatory is engaged in research on fishery resources of common interest for effective utilization and conservation.



Fig. 1 - BCF's "George B. Kelez."

The vessels participating in the spring cruise are the BCF Seattle Biological Laboratory's R/V "George B. Kelez" (550 tons) and the Japanese research vessels "Wakashio-Maru" (150 tons) and "Hokko-Maru" (220 tons)--all veterans of research in North Pacific waters. The George B. Kelez left Seattle on April 2 and will return in early July. The Japanese vessels reached the fishing grounds in late April and will stay until early June.

### Purpose of Cruise

The purpose of the cooperative cruise is to investigate the distribution of salmon and the associated oceanographic features south of the Aleutian Islands; the hypotheses concerning the relation between the distribution of salmon and their environment are being tested. Emphasis is on the distribution and migration of

sockeye salmon from Bristol Bay in relation to the Alaskan Stream and central Alaskan Gyre. The migration routes of these salmon and surface currents are illustrated in figure 2.

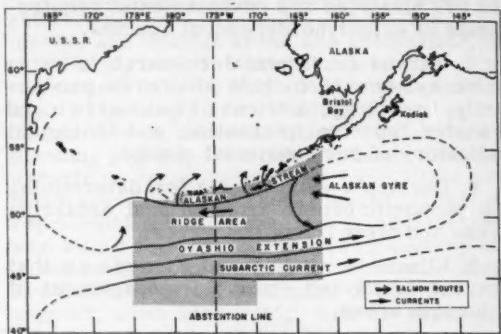


Fig. 2 - Salmon migration routes and surface currents of the study area (shaded) in the central North Pacific Ocean.

Under INPFC provisions, Japan (and her mothership fishing fleet) agreed in 1953 to abstain from fishing for salmon east of long. 175° W. Since then, however, we have found that sockeye salmon bound for Bristol Bay migrate past the abstention line. We hope that research in this area will add to our knowledge of the migration processes--and enable us to forecast the proportion of the run available to the Japanese fishery each year.

Cruise tracks of the vessels are illustrated in figures 3 and 4. The two Japanese vessels are collecting data on fish distribution in the western part of the sampling area; the U. S. vessel is collecting oceanographic data for all areas, as well as fishery data on the eastern section.

### Fishing Gear

Fishing gear are gill nets. The U. S. vessel is fishing a basic string of 32 shackles (2.9 kilometers or 1.8 miles) with five mesh sizes ( $5\frac{1}{4}$ ,  $4\frac{1}{2}$ ,  $3\frac{7}{8}$ ,  $3\frac{1}{4}$ , and  $2\frac{1}{2}$  inches--133, 115, 98, 83, and 63 mm.), stretched measure. The Japanese vessels are fishing a basic string of either 50 tans (2.5 km.) or 100 tans (5.0 km.).

\*Fishery Biologist, BCF Biological Laboratory, Seattle, Wash. 98102.

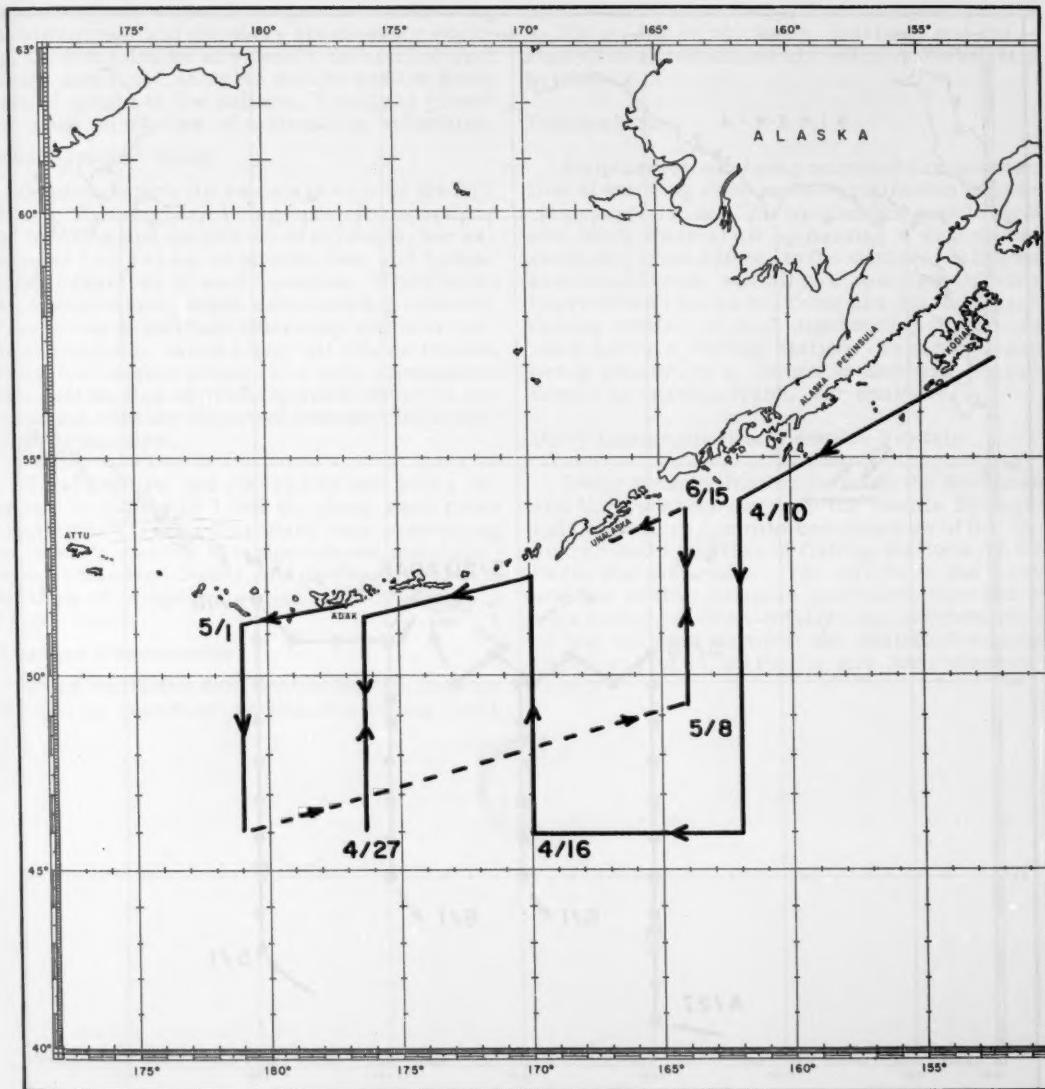


Fig. 3 - Cruise plan of R/V George B. Kelez, spring 1968.

U.S. AND JAPAN CONDUCT SALMON RESEARCH  
IN CO-OPERATIVE CRUISE

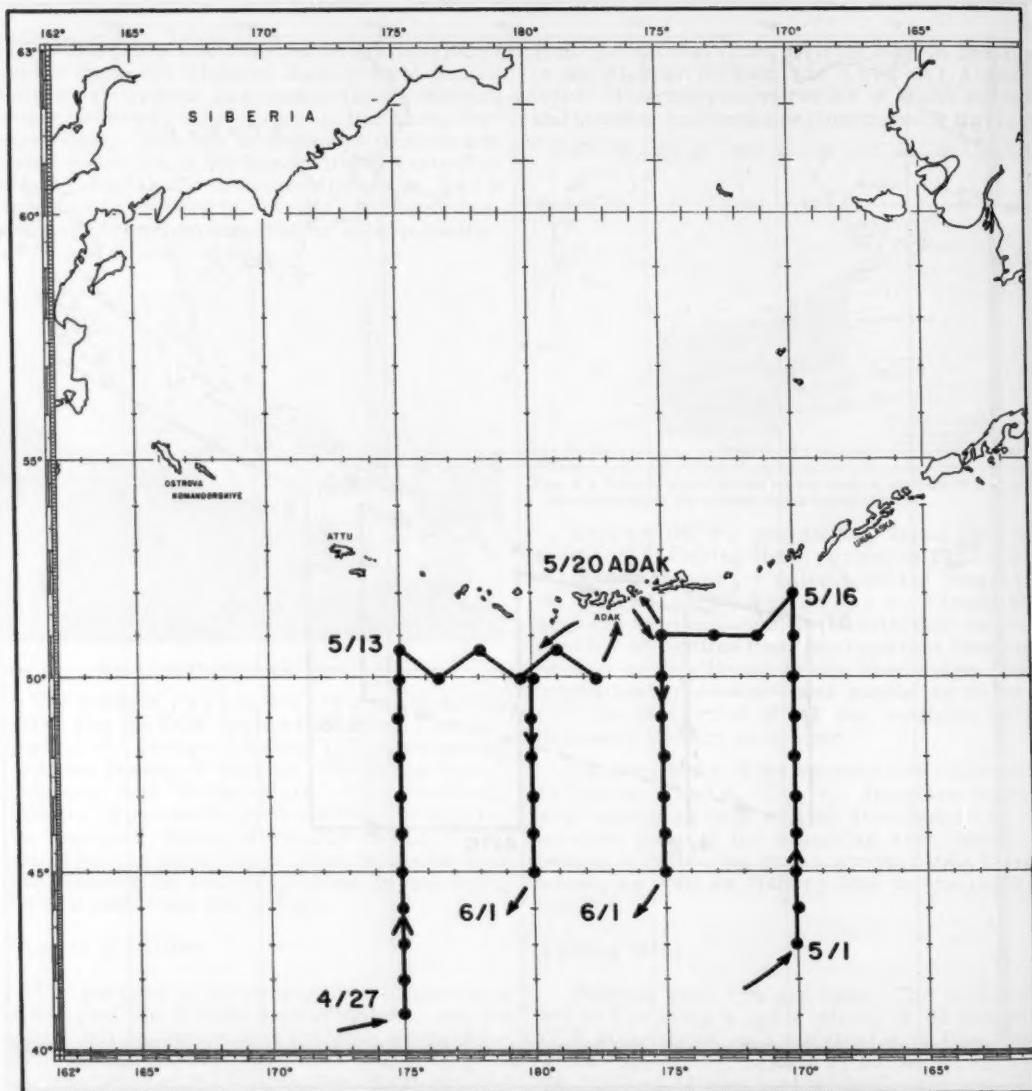


Fig. 4 - Cruise plans of R/V Wakashio-Maru and Hokko-Maru, spring 1968. (From Japanese Fishery Agency)

consisting of five mesh sizes (55, 72, 93, 121, and 157 mm., or 2.1, 2.8, 3.6, 4.7, and 6.1 inches). Data collected at each fishing site include catch by species for each mesh size, lengths of salmon, and scale samples from each fish; the U. S. scientists also are collecting blood samples and pituitary glands from sockeye salmon. Scales are used to determine age; scales and blood samples will be used to study area of origin of the salmon. Pituitary glands are used in studies of maturation schedules.

#### Oceanographic Study

Oceanographic observations by the R/V George B. Kelez are being taken to determine the location and magnitude of currents, the extent and location of boundaries, and hydrographic features of water masses. STD (salinity, temperature, depth data-sensing system), Nansen casts, and bathythermograph observations are being taken along all cruise tracks. Biological observations include zooplankton tows and studies of primary productivity in accordance with the observed distribution of physical properties.

Temperature and salinity are being recorded to depths of 1,500 m. along each principal cruise track. Shipboard data processing includes tabulation of temperatures and salinities at standard depths, and plotting of vertical sections of temperature and salinity along the cruise tracks.

#### Primary Productivity

Solar radiation and fluorescence of sea water will be recorded continuously during April,

May, and June aboard the George B. Kelez. Water samples from the surface are being drawn three times each day for nutrient and chlorophyll analyses; Secchi disk depth and surface primary productivity are being measured at least once daily. Van Dorn bottle casts to 200 m. for productivity, nutrient, and chlorophyll determinations are being made as time permits.

#### Zooplankton

Zooplankton are being sampled for estimation of standing crop and determination of species composition. The zooplankton populations are being sampled by hauling a 45-cm. net vertically from 150 m. to the surface. All tows are in duplicate, and all are completed during hours of darkness. Tows are made at each fishing station, or each night during the cruise when not on a fishing station. Samples are being preserved in formalin and will be returned to Seattle, Wash., for analysis.

#### Daily Communication Between Vessels

Daily communication between the Japanese and U. S. vessels and with the Seattle Biological Laboratory permits coordination of the research and selection of fishing stations on the basis of water mass. The efforts of the three vessels in this common study are expected to contribute substantially to an understanding of the relation between the distribution and migration of salmon and their environment.



## PARACHUTE-TYPE SEA ANCHOR

By Fred W. Hipkins\*

BCF has tested a new parachute-type sea anchor designed to improve the safety of vessels during stormy weather. The anchor recently became available commercially. BCF tested the new safety device in offshore waters near Cape Flattery and in the Strait of Juan de Fuca, Washington, during cruise 92 of the exploratory fishing vessel "John N. Cobb."

Called "Luck Anchor," it comes in two types and several sizes. Basically, it is a parachute configuration having shroud lines reinforced to prevent tearing from the canopy in heavy seas. Weights are also used in some models to prevent rotation. A control line connected to a buoy, which in turn is connected to the crown of the canopy, allows the canopy to collapse when hauled back. It can

be launched and hauled back by two persons. The "Luck Anchor" opens automatically after the buoy line and towline have been payed out. The drifting vessel pulls on the towline to open the chute. Within 10 minutes after launching the anchor, the vessel will turn with the bow facing into the wind and waves, and remain in that position until the anchor has been hauled. The anchor is repacked wet.

### F-Type Anchor

The F-type anchor (fig. 1) was designed to check the drifting speed of a vessel and is used by Japanese fishing vessels when fast drifting is undesirable. In the Strait of Juan de Fuca, with wind velocity steady at 26 knots, the F-type anchor reduced the drifting speed of the John N. Cobb from 2.6 knots to 0.3 knot. It

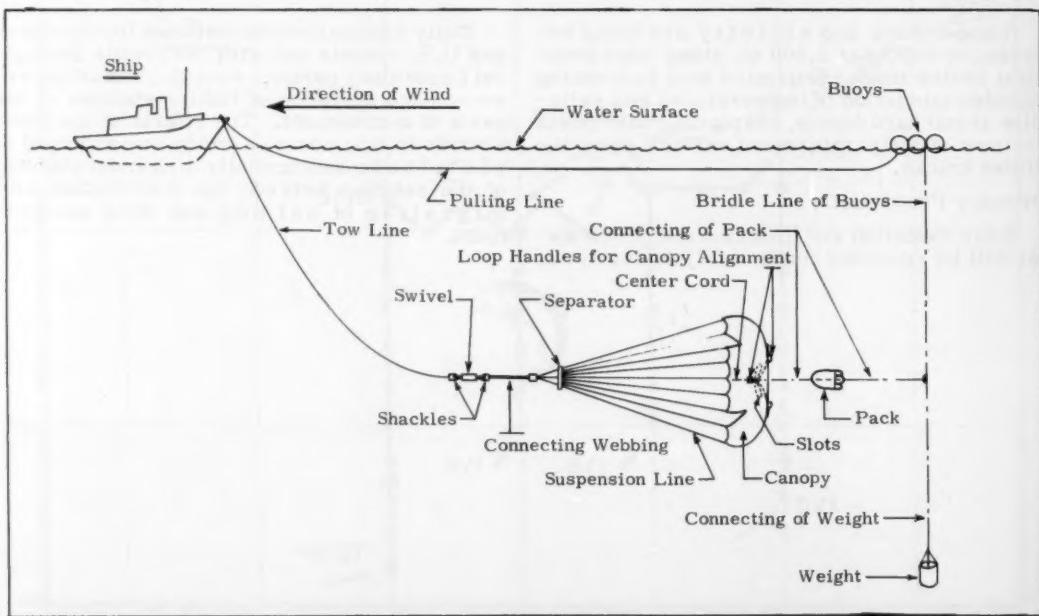


Fig. 1 - General arrangement of Luck-Anchor F-type.

\*Fishery Methods & Equipment Specialist, Exploratory Fishing and Gear Research Base, Seattle, Wash.  
Note: Equipment Note No. 24.

U. S. DEPARTMENT OF THE INTERIOR  
Fish and Wildlife Service  
Sep. No. 815

was also tested in offshore waters in winds that forced other fishing vessels back to harbor.

#### PS-Type Anchor

The PS-type anchor (fig. 2) was designed to keep the bow of the vessel into the wind and waves while drifting at night, or when a vessel breakdown occurs in foul weather. In offshore waters near Cape Flattery, we tested models PS-70 and 50, in addition to the F-140, in winds of 38 knots gusting to 63 knots. When the wind gusted above 38 knots the bow of the John N. Cobb would swing away from the wind direction, and 2-3 minutes were required to reestablish the bow into the wind. After additional lines totaling 400 feet were

#### Towline Tension Measured

We measured towline tension, of the types and sizes tested, under various wind velocities and towline lengths. Generally, the amount of tension increased as the towline was lengthened. For example: using 300 feet of towline with wind velocity at 40 knots, the tension was 1,000 pounds; with 400 feet of towline and the same wind velocity, tension was 2,000 pounds. Using the PS-50 anchor, the minimum amount of tension recorded was 900 pounds at wind velocity of 26 knots. With the F-140, maximum tension was 4,000 pounds at 63 knots. The PS-70 appeared to be the best size for the John N. Cobb, which is 93 feet long, 25 feet in beam, and draws 10.6 feet. An additional anchor, the F-220,

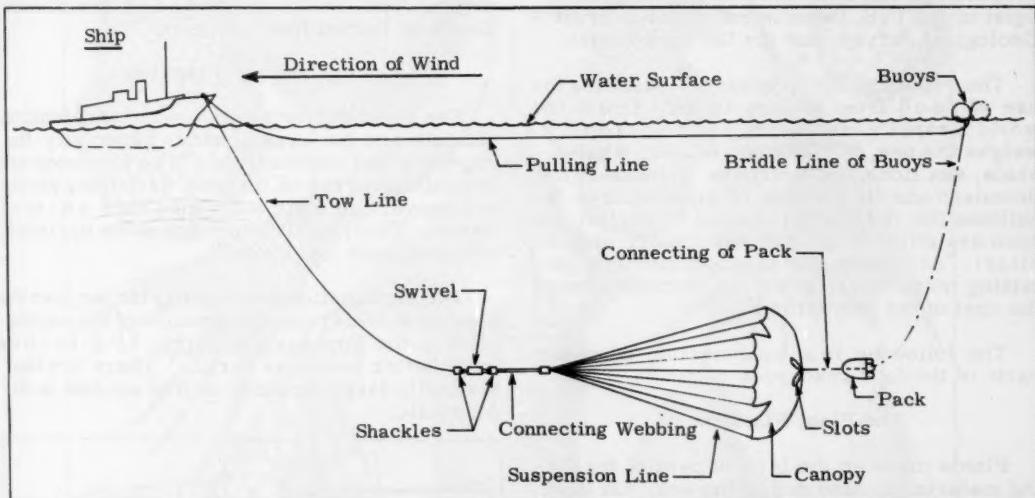


Fig. 2 - General arrangement of Luck-Anchor PS-type.

payed out, the swinging motion nearly ceased. Had the towline been bridled through both the port and starboard chocks--causing a straight pull on the bow--this motion might not have occurred. Several times, the lines were changed from the bow to the stern, resulting in the stern being held into the wind and waves. During all the tests, the rolling of the ship was greatly reduced and the crew and staff were well pleased with the anchor's performance.

was aboard but not tested. From favorable results of those anchors tested, the F-220 would appear suitable for vessels larger than the Cobb.

According to the manufacturer, Nippon Rayon Company, Ltd., Tokyo, who supplied the anchors for testing, "Luck Anchors" will soon be available in all fishing and boating areas of the United States.



# INTERNATIONAL

## Report on Food From the Sea Issued by UN

The United Nations has published a large study of the sea's resources. The first part is entitled, "Food Resources of the Sea Beyond the Continental Shelf Excluding Fish." It was prepared for the UN Economic and Social Council by C. P. Idyll, Institute of Marine Sciences, University of Miami, Coral Gables, Florida.

The second part covers minerals and was prepared jointly by Frank Wang, Marine Geologist of the U. S. Department of the Interior's Geological Survey, and the UN Secretariat.

The report on food resources assesses the use of food from the sea to help feed the world's rapidly increasing population. It weighs the use of plankton, squids, whales, seals, sea lions, and walruses. It looks at the promises and limitations of aquaculture. It outlines the research required to exploit the open sea efficiently. And the report makes clear: "At present, the chief problems of obtaining more food from the sea revolves around the cost of the extraction."

The following is a condensation of major parts of the food resources report:

### The Plant Plankton

Plants make up the largest part of the living material on land and in the sea. On land, plants provide much greater amounts of human food than do animals; the opposite is true for the sea. The amount of sea plants is much greater than that of land plants. But, the UN report says, "sea plants are different from those on land, and the differences render them much less useful to man directly."

Land plants are relatively large and can be transformed easily into "edible and palatable food" for man and for the large herbivorous animals that man eats. Most sea plants are "extremely small, one-celled individuals which usually cannot be seen let alone harvested readily." Altogether, these plants form a great amount of living substance--but they

are spread over the vast ocean and so are hard to harvest. Because these plants are very small, the typical marine herbivore also is very small. "The grazers of the sea that serve to transform plant substance into meat, drift in immense clouds in the water. These drifters are collectively called plankton."

The report evaluates the possible use of plant plankton: "The plants of the ocean are so small that they would be hard to harvest; they sometimes have toxic qualities that would make them unpleasant if not actually dangerous to eat; and most of them possess harsh shells. The prospects of using planktonic plants as human food are poor."

### The Animal Plankton

The most numerous and important plankton animals are the crustaceans, especially the copepods and euphausiids. "The copepods are the chief grazers of the sea, devouring plants and converting their substance into animal tissue. Then, in turn, they are eaten by fishes, sea mammals and birds."

The euphausiids are usually larger than the copepods. One principal species of the euphausiids is the *Euphausia superba*,  $1\frac{1}{2}$ -2 inches long, better known as "krill." There are fantastically large amounts of this animal in the Antarctic.

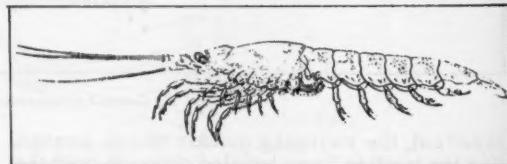


Fig. 1 - Krill.

As for the value of the animal plankton as human food, the report states: "Copepods, euphausiids and other crustaceans in the plankton are rarely poisonous or distasteful, and their shells are usually so soft that they offer no major problems in human consumption, although the proportion of shell to meat is higher than in the larger crustaceans such as shrimp and crabs."

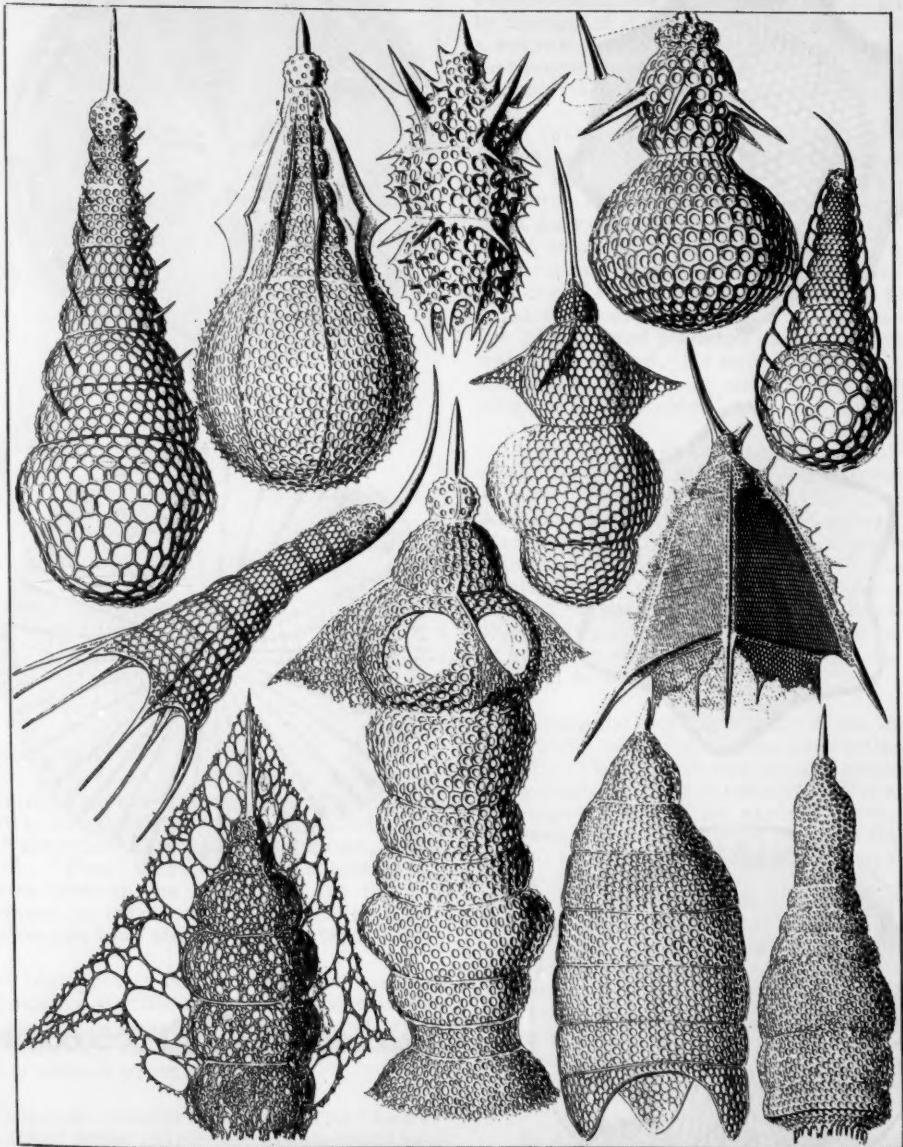


Fig. 2 - Skeletons of radiolarians magnified 200-500 diameters. Radiolaria are single-celled animal organisms ("The Voyage of H.M.S. Challenger": Radiolaria, plate 75)

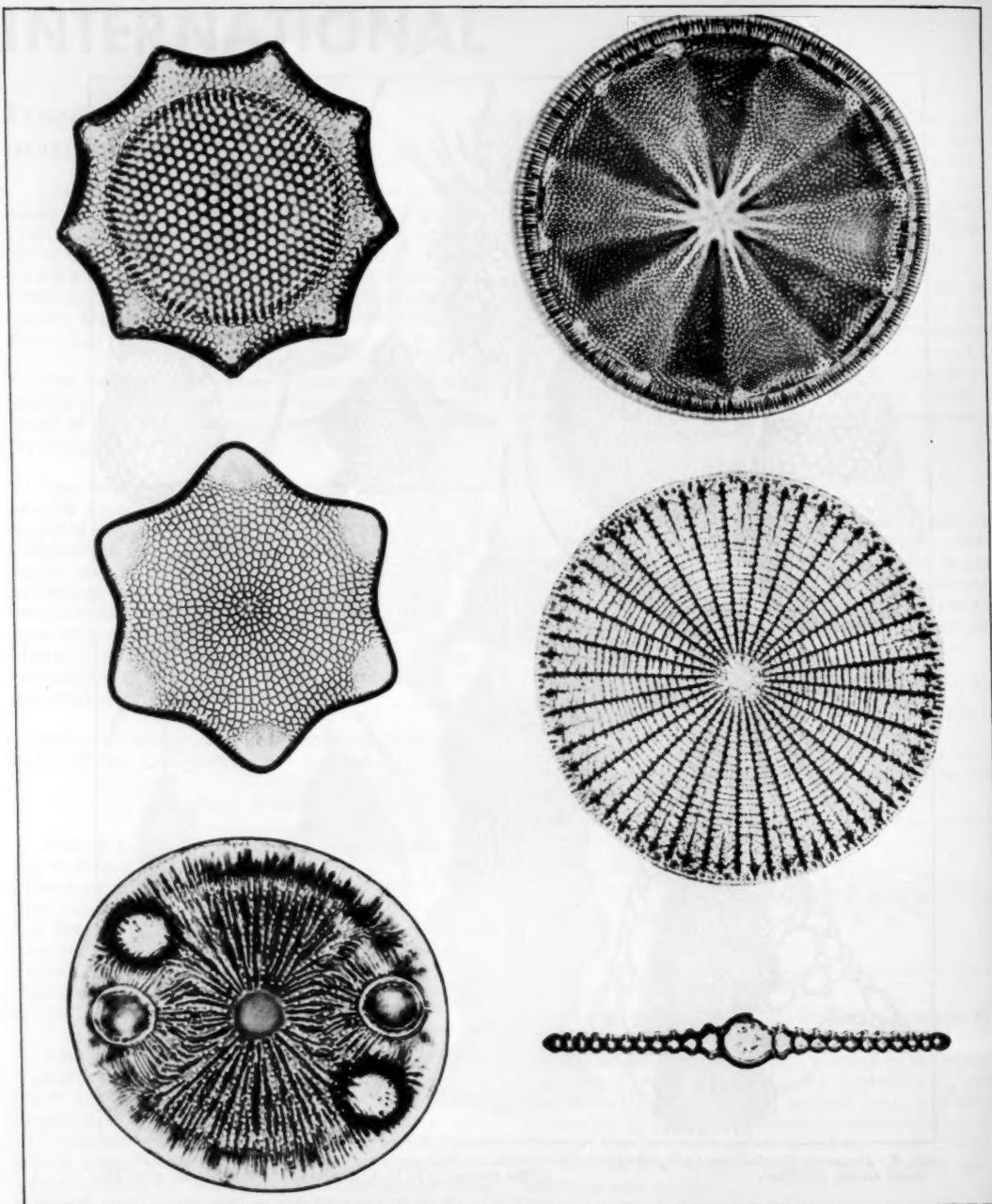


Fig. 3 - Diatoms, drifting plants.

(Photo: Dr. Albert Mann)

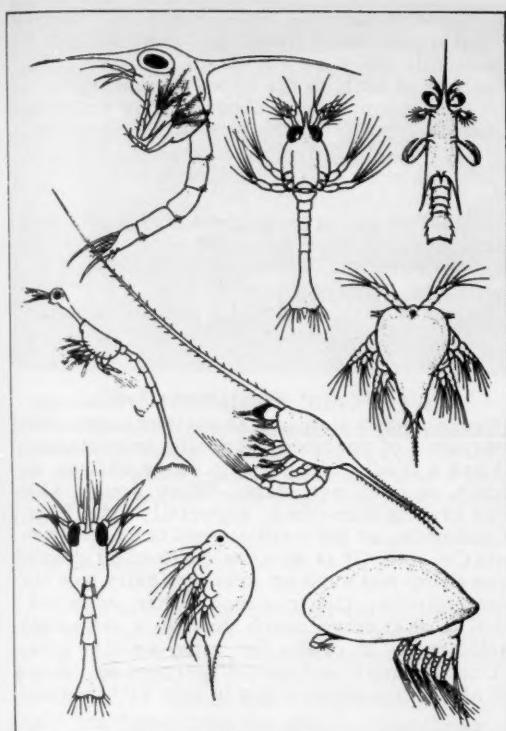


Fig. 4 - Species of crustacean larvae, magnified about 50 diameters, found among planktonic organisms.

(From Johnstone, Scott, Chadwick: Marine Plankton)

#### Plankton's Nutritive Value

Plankton seems rich in nutrient materials essential for man. Its values are similar to hay's: proteins, 11.5%; carbohydrates, 79.3%; ash, 7%. "Thus, there are no substantial differences between the content of the nutrient substances in marine plankton and in this staple forage food plant from the land."

The high protein content of animal plankton is especially significant because world hunger involves the shortage of calories and, even more critically, the shortage of protein--especially animal protein.

Planktonic creatures have important amounts of other nutrients: crustaceans have Vitamins A and D. Krill have large amounts of Vitamin A, especially in the eyes.

#### Plankton's Palatability

Regardless of its nutritional value, the UN report continues, "plankton must be palatable to humans if it is to have any significance as a source of food." Limited experience shows that some people will not eat it, while others consider it a fine food.

In 1952, Alain B. Bombard, a French physician, sought to prove that a man could survive a long time on a raft or small boat from nutrients in the sea. Bombard drifted from the Canary Islands to the West Indies and survived 65 days. (A 10-day period is regarded as the limit man can survive such circumstances.) Part of the explanation of his survival was that he ate plankton. It did not rain for 23 days and plankton supplied part of the water he needed. He said it tasted "... like lobster, at times like shrimp and at others like some vegetable."

A group that studied plankton's palatability reported it "had a mildly pleasant taste, being somewhat reminiscent of shrimp or oysters." At first, some panel members refused to eat plankton but, after tasting it, "pronounced it either good or not objectionable." The tasters could manage a little less than  $\frac{1}{4}$  pound; above that, it became "unacceptable and distasteful." Even a third of  $\frac{1}{4}$  pound "gave the impression of remaining undigested in the stomach after several hours."

During the drifting voyage of the "Kon Tiki" from Peru to the Polynesian archipelago in the Pacific, Thor Heyerdahl caught plankton. He later reported: "If it consisted of many dwarf shrimps, it tasted like shrimp paste, lobster, or crab. If it was mostly deepsea fish ova, it tasted like caviar and now and then like oysters. Jellylike coelenterates like glass balloons and jellyfish were bitter and had to be thrown away. Otherwise everything could be eaten, either as it was or cooked in freshwater as gruel or soup. Tastes differ. Two men on board thought plankton tasted delicious, two thought it was quite good, and for two, the sight of them was more than enough. Spiced and properly prepared, plankton can certainly be a first-class dish for all who like marin food."

In Asia, plankton is used more as a food than it is in the western world. In southeastern Asia, fermented fish pastes are made from many kinds of sea animals, including

planktonic crustaceans. Mainland Chinese eat a shrimp paste "as a main accessory food"; the pastes also are eaten by people in India, Japan, and the Philippines. Plankton is established as a food in a large part of the world.

The UN report concludes this section: "Thus, many problems have still to be solved before plankton can be promoted as human food. But while we should not ignore the possible dangers discussed here, and while problems of nutrition are unsettled, especially in relation to the proportion of potential energy absorbed, the animals of the plankton seem to offer great potential as human food in terms of nutritive value and palatability."

#### Harvesting Plankton

"The story is not so promising from the viewpoints of economic harvesting.... There are immense quantities of plankton in the sea, but in most cases are spread too thinly throughout the vastness of the ocean to allow them to be collected at a reasonable cost at present. But our technology will improve, and new techniques and clever new machines may be developed that will suddenly make an unpromising situation a practical one."

Also needed to establish a plankton fishery is widespread public acceptance. Techniques have to be developed to preserve and package a good-quality product. Today large food companies spend millions of dollars to create markets for new products, which may differ only slightly from old ones. It will take a lot of money to promote a strange food like plankton.

"The best chance of making use of zooplankton is in the manufacture of fodder for domestic animals in the form of dried meal. There may be numerous populations of zooplankton organisms large enough to support properly designed fisheries, once we learn the techniques of harvest and processing." Soviet scientists are actively studying Antarctic krill, and Japanese scientists have done some preliminary work.

The group of zooplanktons believed "most likely to support a commercial fishery" by most experts are the euphausiids, the krill Euphausia superba. It is a relatively large animal--50-60 cm. as an adult. "Of greater importance, it occurs in enormous abundance, and it forms schools at the surface of the sea, where it could be captured by suitable gear."

Soviet scientists have conducted two expeditions to study krill. In the second, in the Antarctic, they used trawls and collected patches of krill in the upper 5 meters of water and pumped them aboard. The krill were scattered down to 100 meters and migrated daily. "Exploitation seems possible on the dense patches close to the surface."

Most of the present thinking about using krill involves making it into meal for supplementary feeding of domestic animals. The Japanese, however, are studying the practicability of using it directly as human food.

#### The Red Crab

"The red crab, a galatheid crustacean, Pleuroncodes planipes, is another zooplankton resource of possible economic importance." It has a planktonic young stage and, as an adult, an open-sea stage. When young, the red crab is numerous, especially off Baja California, at the southern end of the California Current. It is an area marked by coastal upwelling and such an area typically has high productivity. One oceanographer reported that a ship may crunch through a seemingly solid mass of crabs for mile after mile. "Crabs comprised over 80 percent by volume of all microneuston taken in this rich region."

The red crab is found over and beyond the continental shelf. It has been seen at least 1,000 miles southwest of Baja California, in the California Current's extension. The seabottom phase takes place on the continental slope. Studies suggest "that an enormous potential exists for the exploitation of Pleuroncodes. Perhaps the easiest and most productive fisheries would be over the continental shelf, but concentrations offshore may also support catches."

#### The Squids

"Over 80 percent of the weight of animals of the sea consists of invertebrates. By far the greatest bulk of this material is not used as human food and in all probability never will be. Yet a great deal more than is now being consumed is probably edible."

Squids seem to have the greatest potential for exploitation as a food resource beyond the continental shelves--even greater than open-ocean fishes--because they are "widely distributed, very abundant, palatable and nutritious." Squids are cephalopods, which include octopuses, cuttlefish, argonauts, and others.

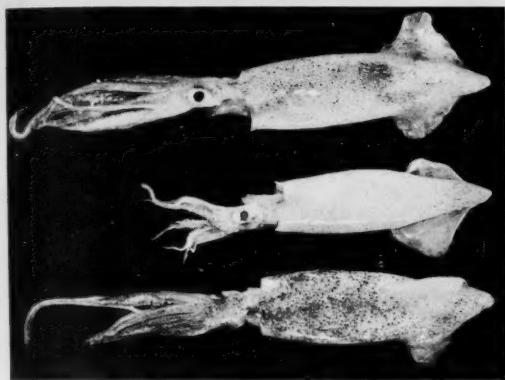


Fig. 5 - Squid. (Photo: V. B. Scheffer)

Squids are highly specialized and have an advanced nervous system. They grow rapidly and some squids reach 55 to 60 feet and 2 tons. Their food varies from plant material to big fishes.

#### Distribution

Squids are among the most widely distributed marine animals: from the coldest waters of the high latitudes, through temperate zones, and into the tropics. Typically, they occur in the high seas beyond the continental shelf, but many are found over the shelf. Sometimes, high-seas species come into more shallow water.

#### World Catch

FAO lists 26 nations that land enough squids to be recorded; 11 countries land measurable amounts of cuttlefishes. Only Japan lands large amounts of squids. In the 1960s, Japanese landings ranged from over 306,000 metric tons to 652,000 metric tons. The No. 2 nation, Spain, was far behind. In the early 1960s, Spanish landings ranged from 12,900 to 19,100 metric tons. After Spain come the U. S., Canada, Taiwan, Norway, Italy, and France. The largest production was in 1963: 820,000 metric tons were reported. Today's world production is estimated at 1 million tons.

#### Squid Fisheries

Squids often travel in schools near the surface and are caught with purse seines and other gear. Jigging, using hooks and lines, is the prevalent method of catching them.

Squids appear in large numbers at night near the surface. Today's commercial fisheries are carried out in shallow waters and almost entirely on spawning populations.

Most squids caught by the Japanese are used for food; this is true too for squid fisheries in other parts of Asia and southern Europe. In the second largest fishery, that of Newfoundland, most squids are used as bait for cod.

Although abundant in nearly every ocean, squids are a major fishery only in Japan. Most production comes from Hokkaido, the northernmost island, where it makes up 60 percent of seafood production. The Japanese use hook and line. They shine bright lights overboard, which attract the squids to the boat. They are caught with hooks baited with imitation feathers. The mechanical reel has replaced the hand in pulling lines in rapidly. One fisherman can catch tons of squid in a night.

The main squid fishing season runs from July to December and peaks in October. The principal area is the Tsugaru Straits between Hokkaido and Honshu. During the first 6 months of the year, the squids move south and are not exploited much; most are caught during their breeding migration in northern waters.



Fig. 6 - Cuttlefish. (Photo: Rex Gary Schmidt)

Most of the catch is eaten in Japan or in Mainland China. About 45% is processed to a dried product; 45% is eaten raw; about 10% is frozen, salted or smoked, or made into paste.

#### Obstacles to Larger Squid Fisheries

"There are four principal factors which hamper the expansion of squid fisheries: a

strong prejudice against them as human food in most parts of the world; some doubt about their nutritional value; the difficulty of capturing them; the lack of knowledge of their biology, distribution and ecology."

#### Squid's Virtues

Squid meat is highly nutritious and compares favorably in most respects with fish. In some important respects, it exceeds fish flesh. "It is perfectly suitable for preparation as meal to be fed to domestic animals."

The quality of squid protein is like that of other flesh products, including red meat like beef. Compared to other animals eaten by man, squid has a larger proportion of edible parts to the whole body. With fish, this proportion ranges from 40 to 70 percent; in squid it is 80 percent. Squid meat has as many calories per unit as white fish meat. The digestability of squid meat is about the same as that of many fishes.

#### The Future

Because squids occur in very large numbers, "they will undoubtedly support large commercial fishery in the next few years." This fishery could even be larger than the present Japanese fishery. Experiments are now underway in Chile to devise methods of catching squids in purse seines. U. S. and Japanese companies are interested in a squid fishery off Peru.

#### Whales

"Whales represent a large and valuable potential source of food and other useful materials for man, but to realize the potential, more wisdom will have to be displayed in international action than has been evident until now, in order that the depleted stocks can recover under reduced exploitation."

#### Seals, Sea Lions, Walruses

"The amount of food available from the seals and other marine mammals is not likely to be large.... The seals, sea lions and walruses represent a resource of small size, but one that could be increased moderately by rational management of herds now depleted by over-exploitation."



## Annual Meeting of Inter-American Tropical Tuna Commission

The 1968 annual meeting of the Inter-American Tropical Tuna Commission was held in Panama City, Panama, April 2-4. Representatives were present from Costa Rica, Panama, Mexico, Canada, and the U. S. Ecuador, which gave notice in 1967 of intent to terminate its membership, was not represented. There were observers from Japan, Chile, Nicaragua, UNESCO, and FAO.

For 1969, a yellowfin tuna quota of 93,000 short tons was adopted. The 15-percent incidental catch limit for yellowfin taken incidental to other species during the closed season was continued--but with a new method of application. Before, the laws of each country were applied so that no vessel fishing during the closed season could land more than 15 percent of yellowfin tuna by weight of the total catch during a single trip. At the April meeting, it was agreed that the yellowfin catch during the closed season would not exceed 15 percent of each country's combined total catch of yellowfin and incidental species; also, that each country could allocate the overall limit among its own fishermen as she chose. It was agreed also that a country taking less than 1,000 tons annually would not be bound by the yellowfin quota.

#### March 1 Opening Proposed

The Commission proposed March 1, 1969, as the date for opening the 1969 season. It requested member nations to vote by correspondence before Sept. 1, 1968. If the vote does not favor unanimously March 1, 1969, then the 1969 season will begin January 1.

#### U. S. Changes Necessary

It will be necessary for the U. S. to change her present yellowfin tuna regulations to comply with Commission recommendations. A notice of proposed rule making was published in the "Federal Register," April 16, 1968. A public hearing on the proposed rules was scheduled for April 29 in San Diego, Calif.



## Poland and Ireland Sign Fishery Trade Agreement

A trade arrangement between the Irish Sea Fisheries Board and 2 Polish State companies, Centromor and Rybex, was concluded in Warsaw in late March 1968. Centromor is the central import and export board for ships and marine equipment. Under the agreement with Centromor, credit facilities will be provided to finance the purchase of Polish-built, steel-hulled trawlers by Irish skippers and fishing companies. Provision also was made for educational and technical assistance to the Irish fishing industry, if required.

### Benefits for Both

In consideration of orders placed in Poland for fishing vessels, Centromor will take into account the capacity of Irish shipyards to construct vessels to Centromor's requirements when it is negotiating orders. Further, Irish shipyards will be given a chance to quote prices for enquiries received by Centromor from foreign countries, whenever Poland cannot build such ships.

Concurrent with the financial agreement with Centromor, negotiations also took place with Rybex regarding markets for Irish fishery products in Poland. Rybex is the Polish fish import/export State company. These discussions resulted in a substantial order for Irish herring to be completed during the 1968/69 herring season.

### Irish Fleet Strengthened

Irish fishermen were investing in powerful modern trawlers. This year they will see a record number of new vessels being commissioned for their fishing fleet. Poland is one of the most advanced fishing nations in Europe. Its shipbuilding yards rank among the Continent's most modern. The quality of their vessels, plus the attractive loan facilities offered, should provide a great stimulus for the expansion of the Irish fishing industry. (Irish Sea Fisheries Board, March 30, 1968.)



## Norway and Indonesia Agree on Joint Venture

A/S Nor Kar of Norway and C. V. Bonito of Indonesia have agreed on a joint fishing venture in Indonesia. The agreement calls for a one-year survey and extends for 15 years.

The fishing grounds covered by the agreement are off the north coast of Sulawesi (Celebes). The operation will be conducted on a pooled-catch basis and will require an investment of US\$1 million. The catch will be marketed in Indonesia and abroad.

### Local Fishermen Protested

Fishing would be at least 15 miles offshore--and thus would have no adverse effect on local fishermen. Presumably, this is an attempt by the Indonesian Government to dispel such fears in advance.

A survey by a South Korean fishing fleet off Java's south coast, in accordance with a contract signed Sept. 18, 1967, was met by strong complaints from the local netters. They claimed the Korean operation reduced their shrimp catch 70 percent. (U. S. Embassy, Djakarta, Mar. 25, 1968.)



## Chile and Peru Differ on Japanese Survey

The Japanese Fisheries Agency plans to explore off the west coast of South America in fall 1968. It will use the 3,200-gross-ton Government research vessel "Kaiyo Maru" to assess the effect of the Humbolt Current on fishery resources.

In late January 1968, a Japanese mission was sent to the South American countries bordering the Pacific to sound out their feelings. The mission found Chile very enthusiastic. Chile promised to make her research data available and requested the Japanese to conduct cookery courses aboard the vessel to promote fish in Chile.

### Peru Cold To Survey

In contrast, Peru was cold both toward the survey and the earlier Japanese industry offer to explore Peru's commercial fishery potential.

The mission noted Peru becoming increasingly cautious over these and similar proposals reportedly advanced by the U. S. However, Peru was inclined to go along with the "Kaiyo Maru" survey--provided it was purely scientific. ("Nihon Suisan Shimbun," Feb. 26, 1968.)



### **North Pacific Fur Seal Commission Meets in Moscow**

On April 12, 1968, representatives from Canada, Japan, the USSR, and the U. S. concluded the Eleventh Meeting of the North Pacific Fur Seal Commission. The Commission was established by the Interim Convention on Conservation of North Pacific Fur Seals ratified in 1957.

At the opening meeting on April 8, M. H. Sukhoruchenko, Deputy Minister, Ministry of Fisheries of the USSR, said:

"The work of the Commission in preserving the fur seal resources and in carrying out the rational killing of fur seals is of great importance. The fruitful cooperation of scientists and specialists of Canada, Japan, the United States and the Soviet Union, who assist the Fur Seal Commission, contributes greatly to scientifically based recommendations which lead to practical steps for the rational use of living marine resources. During the whole period of the Convention, the Commission's work to preserve fur seals has set a good example for the successful resolution of complicated problems of international hunting regulations."

#### **Seeks Maximum Sustainable Yield**

The Commission's research is directed toward achieving the maximum sustainable yield from the fur seal resource. Due regard is shown to the effect on other living marine resources--and toward studies of seal skin quality and the effectiveness of sealing methods.

During 1967, 17,505 skins of fur seals were taken by the Soviet Union on the breeding islands, and 65,816 skins were similarly taken by the U. S. Canada and Japan each received 15 percent from both, as provided by the Convention.

#### **Scientific Committee Meets**

The Commission meeting was preceded by a meeting of the Commission's Standing Scientific Committee, which began March 25.

The Committee completed work on a comprehensive summary of 1964-66 investigations. This will be published in the Commission's 3 official languages. The information in this and earlier reports will be considered by the Governments when the Convention's future is considered after October 1968.

An interesting development in recent years has been the reestablishment and growth of rookeries in the Kuril Islands, where seals had been exterminated during the 19th century.

The Commission reviewed evidence on whether pelagic sealing could be permitted along with land sealing under certain circumstances, without adversely affecting Convention objectives. The Commission decided that the information was not yet sufficient for a final decision. It will recommend that appropriate research be continued.

#### **Exchange of Scientists**

Under the Commission's scientist exchange program, Dr. Tadayoshi Ichihara, Japanese Far Seas Fishery Research Laboratory, visited the Pribilof Islands in 1967 to observe sealing activities and the preliminary processing of seal skins. Hiroshi Kajimura, U.S. Marine Mammal Biological Laboratory, visited Japan in 1967 to observe pelagic sealing for research purposes off the coast.

In 1968, a Japanese scientist will be aboard a U. S. research vessel in the eastern Pacific Ocean. Also, the U. S. plans to send 2 fur seal biologists, an ornithologist, and an interpreter to the Commander Islands.

#### **New Officers Elected**

The Governments rotate Commission offices. Commissioner Miyoshi of Japan was elected next Chairman, and Commissioner Fedorov of the USSR Vice-Chairman.

The next meeting will be held in Tokyo, starting Feb. 24, 1969. It will be preceded by a meeting of the Standing Scientific Committee beginning Feb. 17. (Joint Press Release, Moscow, April 12, 1968.)



## Tuna Fleets of Taiwan, Japan, and South Korea

A Japanese survey shows 935 Taiwanese, Japanese, and South Korean tuna vessels fishing in the Pacific, Indian, and Atlantic Oceans. Japan has 555, Formosa (Taiwan) 226, and South Korea 154.

Taiwan plans to add 69 tuna vessels to her fleet in 1968. South Korea is building 38 new tuna vessels for operation this year.

Area of Operation	Japan <sup>1</sup>	Taiwan <sup>1</sup>	South Korea <sup>2</sup>
	(No. of Vessels)		
East, Pacific Ocean . . . . .	200	0	0
So. Pacific Ocean:			
American Samoa . . . . .	30	86	67
Espiritu Santo & Fiji Is. . . . .	0	15	13
Homeland-based operations	50	0	0
Tasman Sea (off Australia) . . . . .	100	0	0
Indian Ocean . . . . .	130	100	17
Atlantic Ocean . . . . .	45	25	19
Vessels in home ports . . . . .	0	0	38
Total . . . . .	555	226	154

<sup>1</sup>/As of Feb. 10, 1968.

<sup>2</sup>/As of March 8, 1968.

## Japanese To Transfer Vessels

The Japanese fleet is not likely to increase beyond the present level. Japanese fishing firms are planning to transfer vessels from American Samoa and other areas to the Tasman Sea off southeast Australia, and to the Indian Ocean. From latter, catches are being shipped back to Japan because of good prices. ("Suisancho Nippo," Mar. 11, 1968.)



## France and USSR Cooperate in Fishery Matters

The Joint Franco-Soviet Commission on Economic Cooperation, which meets permanently in Moscow, has established a "Working Group on Problems in Cooperation in Food Industries and Equipment." The Soviets are interested in: techniques of overhauling and repairing fishing vessels; canning of fishery products (especially in small cans); processing of algae, mollusks, and shrimp; and plastic packaging of fishery products.

The French are proposing to deliver fishing vessels, completed canneries, fish-meal plants, packaging materials--and to sell salted cod and canned tuna.

It appears that the two countries are preparing to exchange fishery delegations. Several French industry representatives will travel for two weeks to Kaliningrad and Murmansk to study Soviet pelagic (midwater) trawling. They will visit processing "combines" in two fishing centers. ("France Peche," Jan. 1968.)

## Both Seek More Trade Contacts

It appears that the Soviets and French are mostly interested in increasing fishery trade contacts and less in fisheries cooperation as such. They do not compete in any significant world fishery. A 1965 Soviet order for 3 fishing and cannery stern trawlers--world's largest, each over 6,000 gross tons--made it evident to French industry and Government that there is a huge potential market for French products in the Soviet fishing industry.

This Soviet need was filled by other West European countries (Sweden, Denmark, West Germany) until the USSR placed the US\$1 million order for the 3 vessels with the Nantes Shipyards.



## Soviet Research Vessel Visits India and Burma

In late January 1968, the modern, well-equipped Soviet research vessel "Nauka" departed for the Indian Ocean. She was scheduled to stop in Indian and Burmese ports, where Soviet scientists were to meet with their local counterparts.

The cruise's primary mission is to explore new fishing grounds; the secondary one is to test new oceanographic instruments. Also, the vessel will attempt to fish at 1,500 fathoms; if successful, it will be the first time the Soviets have fished that deep with commercial gear.

## 1963 Expedition

During the 1963 International Indian Ocean Expedition, the U. S. research vessel "Anton Bruun" trawled for shrimp deeper than 1,000 fathoms. (Vessels of BCF's Seattle Exploratory Gear Base also trawled as deep as 1,050 fathoms recently.)

The Soviet fishery administrators first visited Burma in 1964. N. S. Goriunov, head of the Directorate for the Exploitation of Fishing Fleets and Port Administration of the Soviet Ministry of Fisheries, led the 1964 delegation, which visited processing plants and the port of Mergui (on Andaman Sea) "to study deep-sea fisheries."

#### 1966 Burma Visit

In Feb. 1966, the Soviet research vessel "Adademik Knipovich" stopped at Rangoon. Four Burmese fishery scientists were invited to participate in a 10-day cruise and joint study of fishery resources off Burma's coast. The Soviet scientific party was headed by Dr. A. S. Bogdanov, Director of the Soviet Federal Institute for Fisheries and Oceanography in Moscow.



#### World Fishery Trade Rose Again in 1966

In 1966, world trade (excluding Mainland China) in fish and fish products reached a record US\$2,400 million. This was \$220 million above 1965 and \$420 million above 1964.

The figures were published February 1968 in the FAO "Yearbook on Fishery Statistics." They were based on trade statistics furnished by 151 countries accounting for almost 90 percent of the 1966 world fish catch of 57 million metric tons. Mainland China, for which no figures were available, would make up most of the remainder.

#### Japan No. 1 Earner

Peru exported the greatest quantity of fish products--1,419,200 metric tons, almost all fish meal--but was third in export earnings. Japan was the biggest export earner, followed by Norway. The biggest importer was the U. S., followed by the United Kingdom. (FAO "News Roundup," Jan.-Feb. 1968.)



#### Fish Oil Prices Decline

The European price for herring oil has dropped. In March 1968, the price of Danish

herring oil was down to US\$93 a metric ton. Last spring, it was \$115 a ton; during 1967, it reached a high of \$182.

Unrefined Peruvian anchovy oil was on its way to Europe. The oil was sold at about \$79 a ton; half-refined Peruvian oil sells for \$91 a ton.

#### Half Icelandic Oil Unsold

Iceland had about one-half last year's herring oil unsold. Some of it was owned by the State herring plants. The mean price State plants received was about \$115 a ton. It is believed privately owned plants sold at a slightly lower price. At present, therefore, price prospects for herring oil are poor.



#### FAO Conference on Fishing Ports & Port Markets: Bremen, September

An FAO-sponsored International Conference on Fishing Ports and Port Markets will be held at Bremen, W. Germany, Sept. 23-28, 1968. It is open to all member nations and associated members. It will be conducted in English, French, Spanish, and German.

During the past few years, FAO's Department of Fisheries has received many requests for information, advice, and technical assistance in developing fishing harbors and port markets. Most important in building a healthy fishing industry are suitable harbors or landing facilities and the development of efficient primary marketing channels. Many questions on the financial and administrative aspects of harbor development also were asked.

#### FAO Report Has Many Answers

To disseminate the available information, FAO's Department of Fisheries has published "Landing and Marketing Facilities at Selected Sea Fishing Ports." This report will be used as a basic working document at the conference.

A provisional agenda for the conference lists for discussion: the role of harbors in development; feasibility studies and planning; civil engineering in fishery harbors; fishing port installations and services; and the administration and financing of fishery harbors.



## FAO-UNESCO Symposium on Caribbean Sea

An FAO-UNESCO Symposium on Investigations and Resources of the Caribbean Sea and Adjacent Regions will be held in Willemstad, Curacao, Netherlands Antilles, Nov. 18-26, 1968. It will review knowledge and identify gaps in scientific investigations and resources research. Its purpose is to improve scientific cooperation and rational use of marine resources in the Caribbean Sea, the Gulf of Mexico, and adjacent Atlantic Ocean.

Another purpose is to facilitate planning of the Cooperative Investigations of the Caribbean and Adjacent Regions (CICAR) to be initiated in 1970 under the Intergovernmental Oceanographic Commission (IOC).

### Agenda

The Symposium will be divided into these sections: (1) physics and chemistry of the area, and ocean-atmosphere interaction, including hurricanes; (2) geology, geophysics, and mineral resources; (3) marine biology; and (4) fishery resources.

Additional information and application forms can be obtained from Dr. N. K. Federov, Director, Office of Oceanography, UNESCO, Place de Fontenoy, Paris 7, France.

Abstracts of papers should be submitted by July 1. Abstracts under sections (1) and (2) should be submitted to Dr. Federov. For (3) and (4), send to Dr. M. Ruivo, Chief, Marine Biology and Environment Branch, Department of Fisheries, FAO, Via delle Terme di Caracalla, Rome, Italy. Languages are English and Spanish.) (UNESCO, Jan. 30, 1968.)



## Symposium Held on Suppressing Odors in Fishery Byproducts

The subject of odor suppression in the processing of animal byproducts was discussed at a symposium in England on March 14, 1968. It is believed the first ever devoted entirely to this subject. Speakers described experiments demonstrating that a substantial reduction in the odor-producing material escaping from a plant does not give a cor-

responding reduction in odor intensity. The most effective method of odor reduction is thought to be confinement and recirculation of the odor-carrying vapors--rather than treatment to remove smells or attempts to mask unpleasant odors.

### Drying Plant

A drying plant was described in which the drying air was continuously recirculated and retained within the plant. Both the output and quality of fish meal produced were equal to those achieved with conventional equipment. Moreover, no vapors were discharged into the atmosphere. Also achieved were a reduction in the amount of water needed for cooling and in the quantity of polluted water produced.

### Other Symposium Subjects

Other discussions concerned the importance of good housekeeping in processing plants, the difficulty of applying a recirculation system to batch production, and the ability of malodorous vapors to carry over long distances with little reduction in intensity. (Ministry of Technology, United Kingdom, Mar. 15, 1968.)



## 1967/68 Antarctic Whale Catch Reported

The Whaling Commission reports the total baleen whale catch during the 1967/68 Antarctic season, by fleet, as:

	Blue-Whale Units
Norway: "Kosmos IV". . . . .	292
Japan: "Tonan Maru No. 2" . . . . .	425
"Nisshin Maru" . . . . .	413
"Nisshin Maru No. 3" . . . . .	230
"Kyokyo Maru No. 3" . . . . .	425
Total . . . . .	1,493
USSR: "Juri Dolgorukij" . . . . .	288
"Sovietskaya Rossia" . . . . .	368
"Sovietskaya Ukraina" . . . . .	360
Total . . . . .	1,016
Grand Total . . . . .	2,801



## International Whaling Commission Calls 2 Meetings

A working session of the International Whaling Commission (IWC) Scientific Committee will meet in Tokyo, June 13-15, prior to 20th Annual Meeting of the Commission. Stock assessments for the Antarctic--and possibly new assessments for North Pacific baleen stocks and sperm stocks in general--will be reviewed.

### Commission Agenda

The Commission will meet June 24-28. It has a lengthy agenda, including the International Observer Scheme, Special Scientific Investigation of the Whale Stocks, and Economic Studies of Whaling Regulations. (International Whaling Commission, Apr. 10, 1968.)



## Southeast Asia Fisheries Center Council Meets

The Southeast Asia Fisheries Development Center held its first council meeting in Bangkok, Thailand, March 19-21, 1968. Represented were Japan, Singapore, Malaysia, Thailand, and South Vietnam. Also present were a U. S. Embassy official and the FAO fishery specialist in Thailand. The programs for fishermen's training at Bangkok and research at Singapore were adopted; administrators were appointed.

### Thai Training Center

For the Thailand Training Center, scheduled to open April 1969, the Director of the Thailand Fisheries Bureau was appointed director, and the Director of the Nansei (Southwest Japan) Regional Fisheries Laboratory deputy director. The Singapore Research Center, scheduled to open in early 1969, will be headed by the Director of the Singapore Fisheries Bureau; the Director of the Nagasaki Fisheries Experimental Station will serve as deputy director.

### Japan's Contributions

To operate the Development Center, Japan will contribute one 350-gross-ton fishing vessel, equipment for land and sea facilities, and fishery specialists. She will provide scholarships for trainees sent to Japan from the Center. Other member nations will be assessed

US\$2,000 a year to finance the projects. ("Suisancho Nippo," Mar. 27, 1968.)



## Dutch Hydrographer Warns of Polluted Seas

Oceanic research and exploration require urgent international cooperation to better use and conserve marine resources, a noted hydrographer told FAO in Rome on April 24.

Rear-Adm. W. Langeraar, hydrographer of the Royal Netherlands Navy and Chairman of the Intergovernmental Oceanographic Commission (IOC), spoke at the opening of the Third Session of the FAO Committee on Fisheries. The 34-nation Committee met until April 30 to discuss urgent world fishery problems and relevant FAO action.

### Oceans Belong to Mankind

Admiral Langeraar emphasized that the oceans and their resources are "the common interest of all mankind" and so require coordinated action--so that future generations "will not stand at the shores of empty seas, polluted beyond recovery." He called for new concepts of law, peaceful cooperation, and mutual assistance to promote the seas' uses for the benefit of all mankind.

Admiral Langeraar stated that "the great drive towards the oceans" began only 11 years ago with the International Geophysical Year. As a result, international cooperation was scattered. He urged "unrestricted cooperation" between governments and international agencies in oceanic exploration and management.

### Greater FAO Effort

Addeke H. Boerma, Director-General of FAO, said that "international collaboration must be perfected to ensure proper exploitation" of the sea's resources. Also, there is need for funds and efforts on an entirely new scale if maximum benefits are to be derived from the world's oceans and inland waters. He cited FAO's own role in promoting fisheries action. He noted the plans to expand FAO's Department of Fisheries to enable it to participate more fully in international efforts.



## Atlantic Tuna May Come Under International Protection

The tuna of the north and south Atlantic may soon come under international protection, reports FAO. A pact safeguarding tuna stocks in the 2 oceans "seems assured of early enactment."

In April, France, Spain, and Canada told an FAO meeting in Rome that they were moving toward adherence to the International Convention for the Conservation of Atlantic Tunas. The Convention was drafted in May 1966 in Rio de Janeiro under FAO auspices. It will establish a commission to protect Atlantic tunas from overfishing.

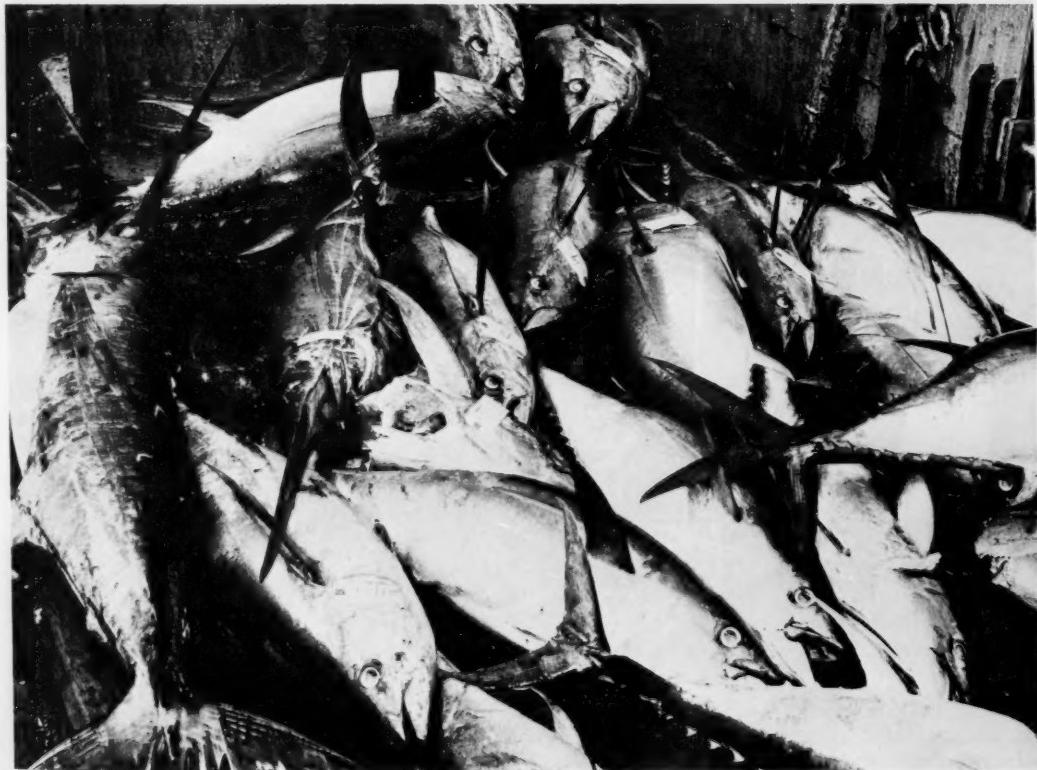
### 4 Signatories Already

Four nations -- the U.S., Japan, South Africa, and Ghana -- already have ratified it. Three more are needed for the required minimum of 7.

The new ratifications were pledged before FAO's Committee on Fisheries, a 34-nation group that met in Rome through April 30.

The group was told that yellowfin tuna stocks in the tropical Atlantic and bluefins in the north Atlantic "are being severely affected by fishing." Also, yellowfins in the Indian Ocean and possibly in the western Pacific need management.

An FAO document said that Japan, the world's No. 2 fishing nation, was taking fewer tunas than before. But there is increased fishing by other nations, including France, Korea, and the U.S. The document cited greater mobility of fishing vessels as a factor, especially off northwest Africa.



Yellowfin, bluefin tuna, and swordfish on deck of BCF's "Delaware" were part of 2-ton exploratory longline catch in the Atlantic.



Canadian lobster fisherman throws overside 25-lb. plastic trap called "igloo."

# FOREIGN

## CANADA

### LANDINGS AND VALUE FELL IN 1967

In 1967, Canadian sea fisheries landings (including those of Newfoundland) were about 2.4 billion pounds with an exvessel value of C\$144.4 million; in 1966, they were 2.5 billion pounds valued at \$159 million. These figures exclude seaweeds. ("Monthly Review of Canadian Fisheries Statistics," Dec. 1967.)

Landings and exvessel values of the principal species were:

	Landings		Value	
	1967	1966	1967	1966
. . (1,000 Lbs.) . .		(C\$1,000) . .		
<u>Atlantic Coast:</u>				
Cod . . . . .	521,369	563,078	23,081	25,092
Haddock . . . . .	102,928	112,819	6,814	8,037
Pollack . . . . .	32,737	34,577	1,290	1,380
Flounder & sole . . . . .	227,326	232,954	7,560	7,764
Herring . . . . .	763,725	569,891	8,222	6,220
Ocean perch . . . . .	173,940	183,079	4,498	5,082
Swordfish . . . . .	8,076	7,403	3,322	3,214
Lobsters . . . . .	35,065	37,338	23,304	22,036
Scallops . . . . .	13,340	18,250	7,770	7,448
<u>Pacific Coast:</u>				
Halibut . . . . .	25,125	32,000	6,353	11,471
Herring . . . . .	110,816	307,653	1,847	5,107
Salmon . . . . .	129,979	162,863	34,988	38,654
Cod . . . . .	10,612	20,706	737	1,436

\* \* \*

### BRITISH COLUMBIA HERRING LANDINGS AND PRODUCTS FALL SHARPLY

On March 20, the Canadian Department of Fisheries, Vancouver, reported the following data on British Columbia herring landings and products produced:

	Unit Tons	Season Ending			3/27/65	3/28/64	3/10/63
		3/16/68	3/4/67	3/26/66			
<u>Landings:</u>							
Queen Charlotte Islands . . . . .	"	-	597	6,628	46,985	32,582	19,856
Northern . . . . .	"	5,307	13,671	25,415	46,632	35,016	42,792
Central . . . . .	"	4,339	33,813	57,856	22,107	56,123	62,626
Upper East Coast . . . . .	"	5,556	15,769	18,807	18,672	15,513	10,697
Middle East Coast . . . . .	"	736	11,750	20,668	23,845	20,347	24,707
Lower East Coast . . . . .	"	1,178	25,459	18,144	37,849	66,216	55,665
West Coast Van. Island . . . . .	"	1,699	32,764	32,847	44,490	36,248	49,304
B.C. total landings . . . . .	"	18,815	133,823	180,365	240,580	262,045	265,647
<u>Products Produced:</u>							
Meat . . . . .	"	3,077	23,356	32,163	43,062	46,778	48,035
Oil (Imp. Gals.) . . . . .	"	427,768	2,776,610	3,855,322	5,436,358	4,877,688	4,771,087

\* \* \*

### QUEBEC FISHERMEN BROKE ALL CATCH RECORDS IN 1967

Quebec fishermen broke all catch records in 1967 by landing 190 million pounds of fish worth C\$7.3 million. This was reported by the Quebec Ministry of Industry and Commerce in the Dec. 1967 issue of "Maritime Fisheries." In 1966, the catch was 144.5 million pounds worth \$6.7 million.

### Catch, Not Fishermen, Increased

The 1967 catch was especially outstanding because there was no increase in number of fishermen. The Quebec Government contributed to the increased production by helping to buy larger fishing vessels. During the six months of 1967 when fishing traditionally is slowest, 41 million pounds were landed, double the 1966 period's.

The Government looks forward to even greater catches as fishermen become more experienced with the new equipment. (U. S. Consul, Quebec, Feb. 26, 1968.)

\* \* \*

### CONFERENCE ON FISHING VESSEL CONSTRUCTION MATERIALS SCHEDULED

A conference to include fishing interests, manufacturers and suppliers of construction materials for vessels is slated for the Queen Elizabeth Hotel in Montreal, Canada, Oct. 1-3, 1968. It will be sponsored by the Canadian Federal-Provincial Atlantic Fisheries Committee (CF-PAFC).

### Canada (Contd.):

The participants will consider traditional and newer materials used, or may be used, in hulls, decks, and superstructures of fishing vessels. These include wood, steel, plastic, aluminum, and concrete. Boatbuilders, vessel owners and operators, naval architects, manufacturers, fabricators, government specialists, and others will examine the advantages of the various products. They will discuss raw materials and their application to design, construction, quality control, vessel operation and maintenance, and their comparative costs.

### International Conference

Like previous CF-PAFC conferences, this one will have an international flavor. Interest already has been shown by foreign fishing, shipbuilding, and manufacturing interests and across Canada. World experts will be among the 30 specialists to present papers. About 400 people are expected to attend. (Canadian Department of Fisheries, Jan. 15, 1968.)

\* \* \*

### REVIEW OF FISHERY SUBSIDIES

Canada's fishing industry is subsidized. A significant part of subsidies is the responsibility of the Provincial Governments. Under a recently amended law, Canada's Fisheries Department provides: 30 percent of cost for wooden fishing vessels over 45 feet and under 100 GRT; 40 percent of cost for wooden vessels over 100 GRT.

This subsidy has been in operation since 1947. Its cost in FY 1966/67 was C\$2.1 million. It also is paid on construction costs for vessels over 75 feet on non-wood hulls. The amount was reduced from 50 percent to 35 percent of costs in December 1967. Total expenditures since 1961 equal C\$72.3 million. Estimated costs in 1967/68 are C\$20 million. The Fisheries Department has no other fishery subsidy program--except those for normal research and development.

### Nova Scotia

There is no construction subsidy for fishing boats. However, Province does provide low-interest loans for boat construction purposes; rate is one-half percent above cost to Nova Scotian Government.

**British Columbia: No fishing subsidy programs.**

### Quebec

Makes grants to fishermen; pays subsidies on construction of small fishing boats and replacement of motors; pays complete federal insurance premium on small fishing boats; and partially subsidizes premiums for large fishing boats. Provincial Government presently is paying catch subsidies on ocean perch (max.  $\frac{3}{4}$ ¢ a lb.), plaice (max.  $\frac{1}{2}$ ¢ a lb.), and cod (max.  $1\frac{1}{4}$ ¢ a lb.). Subsidies diminish as market improves.

### Newfoundland

Under Inshore Fisheries Assistance Program, pays grants or "bounty" of various amounts to fishermen on newly constructed fishing vessels from 24 feet to 35 feet. Approved fishing boats over 36 feet (10 tons) are covered by a Provincial subsidy of C\$160 a ton (Fishing Ships [Bounties] Act, 1955). A grant also is given to fishermen on certain types of nylon and other synthetic fiber gill nets, on nylon lines and long lines. Additional grants are paid under The Coasting Vessels [Bounties] Act, 1959, but these most often apply to freight vessels.

### Other Aid

Low-interest loans are also available to fishermen through the Fisheries Loan Board, primarily to develop and improve inshore fishery. Also available is the Fishing and Coasting Vessels Rebuilding and Repairs [Bounties] Act, 1958. The Inshore Fisheries Assistance program is the largest in terms of dollars. It amounted to close to C\$390,000 in fiscal 1967-68 (April 1-March 31). The Fishing Ships [Bounties] Act is the next largest: about C\$240,000. Subsidy amounts under the other programs are much smaller.

### New Brunswick

Pays a subsidy for vessel construction. The Federal Government pays its share (now 35 percent) directly to the shipyard; fishermen pay 10 to 15 percent, depending on size of vessel; the Province pays the rest. Fishermen repay the Province with interest at 4 percent on the balance outstanding. The effect of the reduction in Federal share of the subsidy from 50 to 35 percent is causing Provincial Government to study costs of construction of steel-hulled trawlers in Europe, especially in United Kingdom and France. New Brunswick has budgeted C\$3.6 million for its boat-building program in 1968.

\* \* \*

### Canada (Contd.):

#### NEW BRUNSWICK BEGINS FISH INSPECTION

The new Fish Inspection Act of New Brunswick is being carried out, announced Provincial Fisheries Minister Ernest Richard on March 26, 1968. The work is being done by a fish inspection and marketing branch within his department. The new branch has 2 purposes: to protect consumers and to promote fish products. From now on all fish plants, fish buyers, and fish peddlers in New Brunswick will have to be licensed. Although retailers will not require a license, their products offered for sale would be inspected on the premises to insure freshness.

#### Assesses European Market

The Provincial Government has assessed European market possibilities for New Brunswick fish products. Reportedly, it found great interest in queen crab, shrimp, salmon, lobster, canned cod livers, cod roe, skate wings and dogfish, and frozen eel. In Germany and Holland, there is demand for frozen herring.

Successful crab and shrimp exploratory projects were carried out by New Brunswick last year; 366,000 pounds of crab were caught and yielded 70,000 pounds of meat. A second processing plant was opened at Shippagan for this purpose; a third is planned in 1968. The market for New Brunswick shrimp was good, especially in Scandinavia and Great Britain. Demand actually exceeded present supply. Shrimp boats will test new gear and be equipped with refrigerated systems.

#### Fisheries Department Programs

West Coast fishermen joined the herring fleet in New Brunswick--spurring worldwide interest in the fishery. The Fisheries Department expanded a training program with local fishermen at the Caraquet school, supplemented by time on board Pacific coast vessels. It expanded technical and financial assistance. And it experimented with the Scottish drift-netting system.

The New Brunswick Fisheries Department had arranged to build 3 steel trawler-seiners

at the Saint John Shipbuilding and Dry Dock Co., Ltd., before the recent reduction in federal subsidy from 50 to 35 percent. The Provincial Government has made strong representations to the Federal Government for retention of the 50-percent subsidy on large fishing vessels. Each trawler-seiner will cost C\$1,200,000.

Costs of vessels in foreign shipyards have been investigated. This despite policies of the department and the Fishermen's Loan Board to have boats built in New Brunswick--and even to allow a 10-percent favorable differential in cost to local yards. (U.S. Consul, St. John, N. B., Apr. 8, 1968.)

\* \* \*

#### CANADIAN PRODUCTION OF FISHERY PRODUCTS IN 1967 AND 1966

	1967	1966
<u>Atlantic Coast:</u>	... (1,000 Lbs.) ...	
Frozen whole & dressed fish . . . . .	11,124	12,634
Frozen fillets . . . . .	124,720	137,071
Blocks & slabs . . . . .	93,805	106,213
Fish sticks . . . . .	1/	4,807
Portions . . . . .	2,941	3,059
Shellfish, frozen . . . . .	11,839	1/
Shellfish, fresh . . . . .	1/	446
Frozen-smoked, dressed or fillets . . . . .	6,033	6,202
Salted and smoked . . . . .	538,604	584,335
Wet salted . . . . .	131,911	109,994
Pickled & cured . . . . .	120,687	115,556
Canned fish & shellfish . . . . .	... (1,000 Cases) . . .	1,471
Fish Meal . . . . .	... (Short Tons) . . .	68,978
Oil . . . . .	... (Imperial Gals.) . . .	3,230
<u>Pacific Coast:</u>	... (1,000 Lbs.) . . .	
Frozen whole & dressed fish <sup>2/</sup> . . . . .	2,333	2,391
Frozen salmon (whole & dressed) . . . . .	19,822	20,318
Other frozen whole & dressed fish . . . . .	15,764	15,768
Frozen fillets . . . . .	4,777	6,450
Frozen smoked . . . . .	808	905
Canned salmon . . . . .	... (1,000 Cases) . . .	1,817
Herring meal . . . . .	... (Short Tons) . . .	27,181
Herring oil . . . . .	... (Imperial Gals.) . . .	3,081,022

1/Confidential--included with "other."

2/Cod and herring only.

(Source: "Monthly Review of Canadian Fisheries Statistics.")



## EUROPE

### USSR

#### ENTERS WORLD FISH MEAL MARKETS

The Fishmeal Exporters Organization reports that during 1967 the Soviet Union exported to West Germany 15,541 metric tons of fish meal. In 1966, such exports amounted to only 2,062 tons.

In January 1968, the Soviet Union exported 3,500 metric tons of fish meal to West Germany, compared with Jan. 1967 exports of 700 tons. This development is surprising because the Soviets have repeatedly stated that their supply is far below present and especially future domestic fish meal demand. By 1970, the demand should approach 1 million metric tons. In 1966, the total Soviet domestic production of fish and whale meals was barely 30 percent of that figure.

\* \* \*

#### FAO SEMINAR ON FISH CULTURE

A seminar and study tour devoted to fish culture was scheduled to be held in the Soviet Union from April 12 to May 25, 1968. The seminar was intended for fishery scientists from developing nations that already have a program for genetic selection or hybridization of fish--or have facilities and personnel to undertake such work (FAO News Roundup).

This was the 11th FAO-sponsored seminar in the Soviet Union. Most lectures and tours were to be held in Kiev and Leningrad. Costs were covered by Soviet rubles available to FAO, except for travel arrangements.

\* \* \*

#### TO STUDY NORTH ATLANTIC CURRENTS

Admiral B. Filippov, Director of the Leningrad Institute of Oceanography, has disclosed that his oceanographers will make extensive investigations of ocean currents in the North Atlantic this summer. It will be the fifth in a series of similar cruises.

Among other things, the oceanographers will explore the characteristics of currents south of Iceland. It is expected that the data collected will make it possible to explain the

instability of the North Atlantic currents, thought to have some connection with atmospheric conditions. It is hoped the research will aid fishery forecasting. ("Politiken," Copenhagen, Mar. 26, 1968.)



### Netherlands

#### ASSISTS FISHING INDUSTRY

Again this year, the Danish Ministry of Agriculture and Fisheries is providing for the modernization of trawlers and cutters and for the breaking up and replacement of shrimp vessels. These objectives are part of a program to structurally improve the fishing industry.

#### Purposes of Loans

Contributions can be granted to trawlers and cutters for these purposes: to instal and improve refrigeration equipment (25 percent of costs to maximum of US\$2,500; to rearrange fish holds (30 percent to maximum of \$2,900 per trawler and \$1,400 per cutter); install hydraulically or electrically driven fishing winches, adjustable propellers, and sonar equipment (20 percent of costs). For trawlers: to install or improve deep-freeze equipment (20 percent of total cost to a maximum of US\$36,200); for cutters: to instal washing-grading machines (30 percent to maximum of \$725).

#### Other Aid

Another arrangement permits a \$5,400 contribution to owners of shrimp vessels definitely withdrawn in 1968 from fishing operations from a Dutch port. If the owner simultaneously replaces the craft, the contribution is US\$3,600 per vessel. If the vessel is also provided with a refrigeration installation, the contribution amounts to \$6,200. ("Het Financieele Dagblad," Mar. 6, 1968; U. S. Embassy, The Hague, Mar. 12, 1968.)



## United Kingdom

### 1966-67 CATCH IN ENGLAND AND WALES

The British Ministry of Agriculture, Fisheries, and Food has reported these 1966-67 catch data for England and Wales:

	1967	1966
Cod . . . . .	656,863	614,203
Haddock . . . . .	102,807	122,465
Saithe . . . . .	72,985	79,609
Plaice . . . . .	83,610	74,967
Other . . . . .	160,804	164,651
Total Demersal Fish . . . . .	1,077,069	1,055,895
Herring . . . . .	27,700	28,697
Other . . . . .	46,720	26,567
Total pelagic fish . . . . .	74,420	55,264
Total fish . . . . .	1,151,489	1,111,159
Total shellfish . . . . .	61,919	46,844
Grand total, England & Wales . . . . .	1,213,408	1,158,003
Grand total, Scotland . . . . .	733,035	896,682
Grand total, Great Britain . . . . .	1,946,443	2,054,686

Note: Original data in English hundredweights (cwt. = 112 lbs.)

\* \* \*

### EXTRA SUBSIDIES GIVEN TO FISHING TRAWLERS

The United Kingdom provides extra subsidies for distant-water, wet-fish trawlers operating out of certain ports in England and Wales. Distant-water trawlers are to receive \$19.20 more each day, middle-water trawlers an additional \$16.80 a day, near-water trawlers \$12.00.

This small additional subsidy is not expected to help this segment of the fishing industry; its difficulties are so deep and persistent that such aid is hopelessly inadequate.

Ports included in the subsidy are Hull, Grimsby, Fleetwood, North Shields, Milford Haven, and Hartlepool. ("Fishing News," Mar. 1, 1968).

\* \* \*

### "FISHING NEWS" DIRECTORY AND EQUIPMENT GUIDE AVAILABLE

Many questions about the British fishing industry are answered in the 1968 "Fishing News" Directory and Equipment Guide. The book lists every government authority, organization, boat builder, supplier of equip-

ment, manufacturer, and agent. Also, the book contains information on: vessels; owners and builders; propulsion; transmission; steering; electronics and radio; chandlery and lifesaving; catching and hauling; and marketing and processing.

The Guide is available from Fishing News Books Ltd., 110 Fleet St., London, E.C. 4, for US\$5.



## Norway

### FISHING INDUSTRY GETS EXTRA SUBSIDY

Following a sharp exchange between non-socialists and socialists, the Norwegian Parliament approved a Government bill proposing a 6 million kroner (US\$850,000) subsidy to the fishing industry. Center Party Rep. Einar Moxnes, manager of the bill, said the proposal sought to offset the most damaging effects of the devaluation of the pound and other foreign currencies. Moxnes said that together with other measures being readied, this extraordinary support should help to create calmer conditions in the fishing industry.

### First to Receive Aid

Fisheries Minister Oddmund Myklebust stated that the fishing industry is the first to receive aid to ease the devaluation impact. In his opinion, the subsidy amount should enable the fishing industry to continue operations and help to hold valuable markets. He expressed concern over the heavy reliance on subsidies and said other measures are also required to solve the problems of the fishing industry, notably better marketing methods.

### Opposition Viewpoint

Speaking for the Labor Party, Rep. Ragnar Christiansen asserted that the Fisheries Minister's statements were a direct breach of promises made to fishermen. He said they also broke the preconditions for the government's decision not to devalue the krone--namely, to give compensation to industries that suffered losses. ("News of Norway," Feb. 26, 1968.)

\* \* \*

### Norway (Contd.):

#### WEST NORWAY HERRING FISHERY FAILS

According to mid-March 1968 information from West Norway, fishermen had landed 15,000 metric tons of fat herring--compared to about 390,000 by mid-March 1967. Unless the catch improves substantially, the situation must be termed catastrophic. So said Director Petter Haraldsvik of the Herring Sales Cooperative Association to a press conference at Kristiansund. More than half the 450 purse-seiners that operated out of Kristiansund in mid-February left to try their luck in North Norway.

#### Fishermen Remain Optimistic

Despite the very poor catch, Director Haraldsvik said, the mood of the fishermen still in Kristiansund is surprisingly optimistic. They trust chief fishery researcher Finn Devold's prognosis that a 500,000-ton herring catch is yet possible. ("News of Norway," Mar. 18, 1968.)

\* \* \*

#### COASTAL FISHERIES ARE IN TROUBLE

Norway's coastal fisheries are in deep trouble. In West Norway, the worst snow storm in a generation kept the large herring fleet in port for several weeks. Now it is feared the herring will not reach their offshore spawning grounds due to a cold-water front.

In the Lofoten archipelago of North Norway, the sea is teeming with spawn-ready cod, and the catch is twice as large as last season's. But fish curers are asserting that prices have been fixed too high and refuse to buy, so fishermen are stuck with most of their catch.

In the northernmost province of Finnmark, nearly 80 percent dependent on its fishing industry, fish curers are saddled with large inventories of stockfish. The situation is really desperate, Fisheries Minister Oddmund Myklebust told the Norwegian "Journal of Commerce and Shipping."

#### Lofoten Cod Fishery

As of Feb. 17, 1,639 craft manned by 4,718 fishermen were engaged in the Lofoten

cod fishery. Landings so far this season were 7,672 metric tons. This was 3,845 tons more than at the same time last year. But, due to the halt in buying, landings were getting markedly smaller.

#### More Herring

When the bad weather ended on the Møre coast, 9,000 fishermen who had been forced to remain idle in ports waited anxiously for word that the herring was running. Instead, they were told by fish researchers that due to a deep cold-water curtain the fat herring would probably not come all the way to the North Møre coast this year.

However, the fleet of 800 vessels, including 400 purse-seiners, was still waiting for a possible change. As of Feb. 22, fishermen had landed less than 1,000 tons of fat herring, as against 310,000 tons on that date last year. ("News of Norway," Mar. 4, 1968.)



#### Bulgaria

#### BUILDS FISHING VESSELS FOR USSR

When Bulgaria entered the Agreement on Cooperation in High Seas Fisheries (signatories: USSR, Poland, East Germany), she was approached by the Soviet Government about building small fishing vessels for the USSR. In 1965, technical designs for a new class of vessels were prepared. But it was not until 1967 that a contract was signed between Moscow's SUDOIMPORT and Sofia's KORABOIMPEKS, both vessel-importing and exporting state-owned firms.

Vessels are built in Burgas Shipyards on Bulgaria's Black Sea coast. The first one was launched in February 1968. By 1970, about 120 of those new 311-displacement-ton vessels will be shipped to the USSR, which will use them mostly in her North Sea and Baltic (and possibly Barents Sea) fisheries.

#### The Vessels

The vessels are 30 meters (98.4 feet) long, 7 meters (23 feet) wide. They have refrigerated hold capacity of about 100 metric tons. The 300-hp. motor can develop about 9.5 knots. With a crew of 19, the vessels will have sea endurance of 19 days. Most of the

### Bulgaria (Contd.):

catch will be lightly salted and refrigerated. In 1968, Bulgaria plans to construct 46 such vessels for the USSR. ("Transporten Glas," Feb. 1968.)



## Portugal

## PRODUCTION AND EXPORTS OF FISH MEAL AND OIL

The Portuguese National Institute of Statistics reports these statistics on the production and exports of fish meal and oil:

	Production			Exports		
	1967 (Jan.-Sept.)	1966	1965 (Rev.)	1967 (Jan.-Nov.)	1966	1965 (Rev.)
Oils . . . . .				(Metric Tons)		
Cod-liver oil & others . . . . .	1/	10,343	11,300	7,150.3	11,608.6	11,322.1
Sperm & whale oil . . . . .	1/	3,776	3,801	3,602.5	3,410.6	3,463.8
Sardine oil & other fish oil . . . . .	1/	1,986	2,098	656.9	2,764.9	1,674.1
Fish meal . . . . .	2,052	4,581	5,401	2,890.9	5,433.1	6,134.1
Fish waste . . . . .	1/	2,072	1,594	3,167.2	3,632.3	2,182.1
		27,532	33,282	1/	4,905.7	7,708.9

1/Not available.



## Greece

#### 1967 CATCH WAS DOWN

Greece's total landings (unofficial) in 1967 were 102,317 metric tons, compared with 108,082 tons in 1966. The decline was caused by lower catches in the inshore fishery; the high-seas fishery increased.

In the Atlantic fishing area (and including Indian Ocean and South African waters), declining production in northwest African grounds is causing alarm. More trawlers operating in Libyan waters accounted for increased catches in the Mediterranean fishing area. Midwater fishing was successful only

	1967	1966
	(Metric Tons)	
Atlantic . . . . .	31,817	29,582
Mediterranean and other-than-Greek waters . . . . .	4,000	3,500
Midwater . . . . .	42,000	47,000
Coastal . . . . .	14,000	16,000
Inland waters . . . . .	10,500	12,000
Total . . . . .	102,317	108,082

for mackerel. A reduction in available stocks, believed caused by natural causes, is responsible for the smaller production in coastal and inland waters. ("Alieia," Feb. 1968.)



## Denmark

## GREENLAND SEAL SKINS AUCTIONED

On March 15, 1968, an auction of Greenland seal skins was held at the Danish Fur Sales, Copenhagen, for the Royal Greenland Trade Department. Virtually all skins offered--25,896--were sold. The upward price trend evident at the Sept. 5, 1967, sale con-

tinued. The next auction of seal skins is scheduled for Sept. 5, 1968. (U.S. Embassy, Copenhagen, Mar. 22, 1968.)

Type of Seal	No. of Skins Sold	Grade		Avg. Price	Top Price
Ringed	310	1A <sup>1/</sup>	washed	.. (US\$) ..	
	1,204	1B	washed	15.64	19.55
	5,010	2A	washed	10.83	14.29
	2,294	2B	washed	6.54	10.22
	502	2C	washed	2.70	6.61
	1,388	2C	washed	5.56	8.87
	7,581	3A	washed	9.77	15.04
	1,140	3B	washed	4.06	4.96
	2,508	3B	washed	6.69	11.13
	2,098	3C	washed	1.58	2.86
Total ringed	24,035				
Harp	788	3A	washed	10.15	18.80
	40	3B	washed	5.71	5.71
	34	3C	washed	2.63	3.46
Total harp	862				
Saddle	240	3	washed	9.10	15.04
Bladdernosed	31	1	washed	17.44	18.80
	96	2	(Bluebacks)	10.75	16.16
	592	3	washed (Bluebacks)	9.02	26.69
Total bladdernosed	719				
Grand total	25,856				

1/Forty 1A washed skins were not sold; these were the only skins offered but not sold at this auction.

## Spain

### VIGO IS EUROPE'S NO. 1 FISHING PORT

The Spanish port of Vigo is now Europe's largest fishing port. Its sudden emergence as the leading port is attributed to the large increase in landings of frozen fish caught by Spanish trawlers off South Africa. Landings in 1967 at Vigo were about 152,000 metric tons, more than 10 percent above 1966.

\* \* \*

### A PROMISING TUNA MARKET

Market research conducted by the Japan External Trade Organization (JETRO) reveals that Spain has entered the tuna fishery. Spain is a much more promising frozen-tuna market than any other European country.

Spain is expected to increase the number of fishing vessels and catches. She now has 13 tuna fishing vessels equipped with freezing facilities; there were only 2 pelagic tuna fishing vessels in 1963. She is steadily building new tuna vessels with modern freezing facilities.

### Largest European Production

Spain's tuna catch in 1965 was 42,000 tons--the largest by a European country, including Italy and France. Spaniards and Japanese have much in common as far as diet goes. Consumption of canned tuna in Spain is increasing yearly as national income increases. Spain has not exported frozen tuna since 1964. Therefore, it is unlikely that Spain will turn to a frozen-tuna export country unless many more tuna fishing vessels are built.

### Promising Market for Japan

Unlike the Italian market, canned albacore is most favored by Spaniards; so Spain is a good customer of Japan. Spanish statistics show room for a promising market for Japan's exports of tuna: Spanish imports of frozen tuna for canning were 836 tons (514 tons from Japan) in 1963, 687 (388) in 1964, 8,181 (6,343) in 1965, and 2,216 (1,584) in 1966.

## Albacore Market

Spain is developing into a supplier of marine products to the European Economic Community (EEC). She is a promising market for frozen tuna (especially albacore) because of her canning capabilities. This will be true as long as import restrictions are not imposed. ("Suisan Keizai Shimbun," Mar. 5, 1968.)



## France

### OCEAN STUDY WILL HELP FISHING

A comprehensive scheme of oceanography to be announced by the Centre National pour l'Exploration des Oceans (CNEXO) is likely to play a big part in the future of the French fishing industry.

The program will include intensive research into fish populations and migration, mineral content of the oceans, water pollution, and the effect of interactions between sea and atmosphere.

### Sub and Bathysphere

The 2,200-ton research vessel "Jean-Charcot" will be joined by a submarine now being built and equipped specially to observe life down to 2,000 ft. The bathysphere "Archimede" will work greater depths.

The possibility of creating new fishing grounds by "sowing" fresh banks of plankton will be studied. Some scientists are convinced this can be done--and that the fish will quickly learn the locations of this food supply and breed there.

CNEXO, in existence only a few months, already has made a start on the work for which it was created. M. La Prairie is its director-general. ("Fishing News International," March 1968.)



## Ireland

### FISHING INDUSTRY GROWTH CONTINUES, REPORTS BOARD

Landings increased in 1966, exports compared with those in 1965, and home consumption of fishery products continued upward. This is reported by the Irish Sea Fisheries Board (ISFB) in its fifteen annual report 1966/67.

The yearly increase in landings are resulting in an accelerated rate of investment in the industry and this should produce further expansion of industrial activity. "However," ISFB states, "the achievement of targets for the industry demand a much higher input of capital." ISFB is studying ways of getting more financing; it also is giving attention to a promotion program that would encourage greater investment in the processing sector of industry.

#### Exports a Key to Growth

Increased investment in boats depends on satisfactory growth in market outlets. Irish domestic needs for edible fish "are easily satisfied" during periods of heavy landings. The industry must export more fresh and processed fishery products. ISFB states that the closeness to Britain "should encourage us to develop a regular export trade in fresh fish to this market"--of high enough quality to make it easy to promote at premium prices. "The establishment of quality standards for fishery products is an urgent requirement."

ISFB reported "considerable progress in improving gear operating efficiency on boats. The educational and training programmes introduced in the ports were very well sup-

ported by fishermen," but much remains to be done in educational field.

#### Production

The value of fish landed in 1966 was 20% above 1965. A major factor was the rise in quantity and value of pelagic fish landed (particularly herring): 40% in quantity and 56% in value over 1965.

Table 1 - Quantity and Value of Sea Fish  
(Excluding Salmon) Returned as Landed in 1965 and 1966

Kinds of Fish	1966		1965	
	Quantity CWT.	Value £	Quantity CWT.	Value £
<u><b>Demersal</b></u>				
Soles . . . . .	3,057	71,060	3,741	84,565
Brill . . . . .	1,264	13,733	2,120	22,665
Turbot . . . . .	1,491	15,936	2,042	21,164
Plaice . . . . .	28,117	222,668	23,828	181,609
Dabs . . . . .	3,827	10,053	4,443	12,056
Mergrims . . . . .	4,295	16,316	4,698	15,979
Other flat fish . . . . .	2,635	11,245	2,491	9,139
Ray/Skate . . . . .	22,418	90,164	23,879	98,678
Cod . . . . .	38,839	153,238	32,306	131,917
Haddock . . . . .	29,087	106,222	34,397	106,451
Hake . . . . .	1,551	15,827	1,765	11,653
Whiting . . . . .	99,248	215,634	108,164	211,308
Pollack . . . . .	11,423	30,532	13,187	34,176
Other round fish . . . . .	25,239	23,075	25,131	18,002
Total demersal . . . . .	272,491	995,703	282,192	959,362
<u><b>Pelagic</b></u>				
Herrings . . . . .	293,300	399,312	210,555	251,521
Pilchards . . . . .	360	198	39	157
Mackerel . . . . .	29,645	46,389	40,213	45,853
Sprats . . . . .	30,520	12,573	29,678	12,218
Total pelagic . . . . .	353,825	458,472	280,485	309,749
Total wet fish . . . . .	626,316	1,454,175	562,677	1,269,111
<u><b>Shellfish</b></u>				
Lobsters . . . . .	491,668	231,482	362,851	150,415
Crawfish . . . . .	160,693	117,553	163,899	108,147
Crabs . . . . .	49,582	1,336	118,593	2,207
Scallops . . . . .	309,454	9,584	197,668	5,342
Oysters . . . . .	1,387,201	29,871	1,465,179	31,084
<u><b>CWT.</b></u>				
Dublin Bay prawns . . . . .	24,735	83,275	15,769	62,287
Mussels . . . . .	15,134	7,617	18,597	7,627
Periwinkles . . . . .	45,179	84,584	33,356	58,052
Other shellfish . . . . .	3,666	13,859	2,408	6,101
Total value shellfish . . . . .	-	579,161	-	431,262
Grand total value . . . . .	-	2,033,336	-	1,700,373

Source: Department of Agriculture and Fisheries.

The total value of shellfish landed rose one-third. Although the value of demersal fish landed increased, quantity declined from 1965. Responsible for the decline were the greater concentration by many larger craft

### Ireland (Contd.):

in pelagic fishing--and increased fishing of crustaceans.

### Fish Resources

The demersal resources around Ireland's coasts continued to produce fair catches for more boats. There was increased fishing and landings of existing herring stocks--particularly off the North Mayo Coast and in South Eastern fishery.

The greater use of the mid-water trawl greatly helped this expansion. A Norwegian boat introduced local fishermen to purse seining in Irish waters.

Concerning shellfish, there were resource investigations on shrimps, scallops, and lobsters. New gear and equipment were introduced into lobstering. Many lobster and crawfish boats now use the new American parlour lobster pot. They are also installing hydraulic hauling equipment.

### Market Development

In 1966, per-capita fish consumption rose 5% over 1965. The figure is 10.1 lbs. per person per year. Exports of fresh and processed seafish increased 47%--to £1,522,000, up £660,000 over the previous years.

Exports of processed fish products showed "very satisfactory growth." This was particularly true of salted herring exports to France. Processed fish exports were worth £609,000; the 1965 figure was £297,000.

"The significant increase in fish consumption on the home market was reflected in im-

proved fish distribution throughout the country." Regional wholesalers were helped to develop regular, extensive, distribution services to retailers.

Table 2 - Imports and Exports of Fish and Fishery Products in 1966 as Compared with 1965

	1966		1965	
	Quantity	Value	Quantity	Value
	CWT.	£	CWT.	£
<b>Imports</b>				
Fish, fresh, chilled or frozen . . . . .	20,307	85,212	21,604	78,325
Fish, cured--not in airtight containers	28,395	205,275	30,983	229,797
Fish and fish preparations in airtight containers . . . . .	32,757	688,808	28,733	661,673
Other fish and fish preparations . . . . .	11,867	266,707	9,741	233,689
Totals . . . . .	93,326	1,246,002	91,061	1,226,026
<b>Exports</b>				
Fish, fresh, chilled or frozen:				
Salmon . . . . .	17,159	782,334	19,420	723,779
Herrings . . . . .	100,434	217,755	68,760	138,654
Freshwater eels . . . . .	6,075	106,218	8,433	120,944
Other fish . . . . .	15,338	217,710	19,301	236,389
Fish, dried, salted or smoked not in airtight containers	97,089	351,948	17,695	108,677
Shellfish, fresh, chilled, frozen, salted, dried . . . . .	68,489	703,012	61,917	566,192
Other fish and fish preparations . . . . .	2,441	113,554	2,534	77,248
Totals . . . . .	307,025	2,492,531	198,060	1,971,883

Source: Department of Agriculture and Fisheries.

### Fish Processing Standards

During 1966, the first standard for processing fish products was developed. It was the work of ISFB, the Irish Institute for Industrial Research and Standards, and the Department of Agriculture and Fisheries. This standard will be followed by others covering all seafood products processed in Ireland for home use and for export. Companies that meet these standards will be licensed to carry the Institute's symbol of quality.



## LATIN AMERICA

### Mexico

#### SETS CLOSINGS AND SIZES FOR SPINY LOBSTERS, SHRIMP, TURTLES

Mexico has announced the following closed seasons and minimum size limits for spiny lobsters, shrimp, and turtles:

	Closed Season	Minimum Size
Spiny lobster	Mar. 16-July 15 (Gulf & Caribbean)	145 mm. tail length, measured from tip of tail to base of cara- pace
Red spiny lobster	Mar. 16-Sept. 30 (Baja Calif., from U. S. border to Punta Entrada)	82 mm. carapace length
Blue & green spiny lobsters	July 1-Sept. 15 (Baja Calif., south of Isla Margarita, all of Gulf, and rest of Pacific Coast)	82 mm. carapace length
Shrimp <sup>1/</sup> :	Apr. 16-Sept. 1 (a) Bays, estuaries, lagoons (b) Ocean	125 mm. overall length
Marine turtles	June 1-Sept. 30 (all of Pacific Ocean and Gulf of Calif., except northern Gulf and Pacific coast be- tween Todos Santos and U. S. border)	Varies with species

1/Caribbean fisheries not affected.

\* \* \*

#### FRENCH EXPLORATORY FISHING VESSEL GOES ON REEF

The French vessel "Adrian Pla" conducted exploratory fishing and on-board processing under a recent French-Mexican technical assistance agreement. Three trips were completed, each with Mexican biologists and fishermen aboard.

The first trip was along the north shore of Yucatan; the second in the Bay of Campeche; and the last along Yucatan's east coast. Shrimp and incidental species were sorted, packed, and frozen on board. The French captain reported that the Mexicans were interested primarily in snapper and shrimp, which were not taken in sufficient quantities to pay for the vessel's operation.

### Runs Onto Reef

On March 6, during the last trip, the vessel ran onto a reef 14 miles south of Isla Mujeres and was first reported in danger of sinking. Later towed off, it continued to explore on the way to a shipyard.

There was much comment in the Mexican press on entrusting a million-dollar vessel to a skipper without sufficient knowledge of local waters. Reportedly, the French captain was relieved of his command. (U. S. Consulate, Merida, March 8; various sources.)



### Honduras

#### ORDERS SHRIMP VESSELS FROM SPANISH FIRM

Several shrimp vessels are being built for Honduras at the Celaya (Spain) shipyards for about US\$1,000,000. The vessels are 87 feet long, 21 feet wide, with a deadweight of 104 tons.

They will have refrigerator holds with a storage capacity of 3,500 cubic feet. The cruising speed will be 10.5 knots. ("Mexico City News," March 2, 1968.)



### Argentina

#### CATCH AND OUTPUT OF FISHERY PRODUCTS CONTINUE UPWARD

The 1967 Argentine fishery catch continued the upward trend of recent years: It was 8 percent above 1966. The catches of hake, anchovy, bonito, pargo, shrimp, centolla, squid, and octopus increased; catches of tuna, langostino, and mussels declined. Algae and inland fish production also increased.

For the first time, exports of fishery products outpaced imports: US\$3,612,300 of products were exported; imports were \$1,260,400.

## Argentina (Contd.):



Unloading and packing fish at Mar del Plata, Argentina.

Catch and Production 1965-67			
	1/1967	1966	1965
<b>CATCH:</b>			
Total . . . . .	271,748	250,826	205,044
Marine . . . . .	226,897	211,066	172,107
<b>SELECTED SPECIES:</b>			
Hake . . . . .	75,605	68,498	76,617
Anchovy . . . . .	13,416	10,978	16,561
Tuna . . . . .	948	1,195	1,674
Bonito . . . . .	1,230	490	138
Bream . . . . .	9,544	7,516	4,074
Total fish . . . . .	183,258	201,519	163,198
Shrimp . . . . .	411	207	390
Centolla . . . . .	226	106	52
Langostino . . . . .	204	406	275
Squid . . . . .	2,266	1,031	417
Mussels . . . . .	5,750	5,865	6,587
Octopus . . . . .	1,406	867	-
Algae . . . . .	32,006	29,668	19,907
Inland . . . . .	12,845	10,091	13,030
<b>PRODUCTS:</b>			
Fish meal . . . . .	24,517	22,067	15,787
Canned fish . . . . .	9,670	15,489	17,883
Frozen fish . . . . .	4,250	4,997	8,136
Exports (Qty.) . . . . .	15,043	13,210	9,260
" (Value) . . . . .	US\$3,612,300	(\$2,791,162)	(\$1,418,270)
Imports (Qty.) . . . . .	2,716	10,608	20,012
" (Value) . . . . .	(\$1,260,400)	(\$3,513,703)	(\$4,110,195)

1/Preliminary data.

## Fishery Products

In the filleting industry, economic problems beset the 21 plants operating in 1967 and prevented expanded production over 1966. In the fish-meal industry, 23 plants operated (12 for marine fish and 11 for fresh-water species), but only 18 worked all year. Fish-meal production increased 9 percent; production of canned and frozen fish declined.

At year's end, 67 vessels capable of high-seas fishing were registered, as well as 317 inshore vessels and 42 smaller craft. (Direccion General de Pesca y Conservacion de la Fauna, Buenos Aires, March 19, 1968.)



## ASIA

### Japan

#### TRAWL FISHERY PRODUCTION IN NORTHERN WATERS

The Japanese Fisheries Agency reports northern waters trawl fishery production by mothership fleets during 1967 as 771,157 metric tons in the Bering Sea, and 132,960 metric tons in the Gulf of Alaska.

The 1967 Bering Sea catch surpassed the 1966 landings of 441,374 tons by 329,783 tons--by about 75 percent. This was due primarily to the sharp increase in Alaska pollock landings: in 1967, 566,437 tons; in 1966, 265,605 tons. Alaska pollock is the principal species used in making fish meal and minced meat.

The Gulf of Alaska catch in 1967 was nearly 40 percent above 1966's 95,045 tons. It was attributed to the entry of more trawlers into the fishery in fall 1967.

#### Fishing Areas Enlarged

On Sept. 1, 1967, the Fisheries Agency enlarged the Bering Sea and Gulf of Alaska fishing areas. It also redesignated the Gulf fishery as the Northern Area Distant-Water Trawl Fishery.

The Bering Sea area was enlarged to include waters bounded by 160° E. and 170° W. longitudes north of 50° N. latitude. Previously, the eastern boundary of that fishery south of the Aleutian Islands was 175° W. longitude, and the western limit was 170° E. longitude.

The Gulf of Alaska fishing grounds were expanded broadly; they encompass the North Pacific Ocean and the Bering Sea east of 170° E. longitude, north of 10° N. latitude. The 10th parallel falls close to Puntarenas, Costa Rica. ("Suisan Shuhō," March 5, 1968, and other sources.)

Table 1 - Bering Sea Mothership-Type Bottomfish Production, 1957-67

Year	No. Mother- ships	Catcher Vessels	Flatfish	Turbot	Halibut	Cod	Alaska Pollock	Sablefish	Rockfish	Shrimp	Herring	Others	Total
(Metric Tons)													
1967 1/	14	1/170	75,689	22,566	1,188	31,905	566,437	7,392	30,540	3,286	31,449	705	771,157
1966	14	171	59,698	12,531	944	19,693	265,605	6,844	45,388	2,934	25,213	1,974	441,374
1965	14	214	23,978	10,321	1,622	19,515	231,658	3,758	46,505	9,761	33,426	737	381,281
1964	14	228	65,728	33,029	2,448	19,442	178,560	8,030	44,162	20,883	42,887	275	415,444
1963	19	255	35,346	29,305	9,668	15,483	113,695	19,997	25,428	31,612	31,619	233	312,386
1962	23	290	288,690	58,226	9,898	9,671	59,536	28,381	12,527	18,005	9,946	3,701	498,581
1961	33	360	398,956	57,335	11,141	6,834	24,398	26,182	13,705	10,225	73,901	796	623,473
1960	13	180	360,103	36,843	6,931	5,679	26,097	1,861	1,507	680	403	9,828	449,932
1959	7	68	120,704	-	2,240	3,632	32,798	393	9	-	-	379	160,150
1958	4	33	39,153	-	1,271	223	6,924	32	1	-	-	147	47,751
1957	4	13	24,145	-	-	-	-	-	-	-	-	-	24,145

1/F from September 1, 1967, mothership fleet was reduced to 12 fleets and catcher vessels increased to 173.

Table 2 - Northern Area (Gulf of Alaska 1/1) Distant-Water Bottomfish Production, 1960-67

Year	No. Mother- ships	Catcher Vessels	Flatfish	Turbot	Cod	Alaska Pollock	Sablefish	Rockfish	Shrimp	Herring	Others	Total
(Metric Tons)												
1967	11	33	1,826	5,004	3,047	7,585	8,483	97,930	1,191	-	7,894	132,960
1966	7	7	766	4,701	1,349	9,235	3,701	73,435	353	-	1,505	95,045
1965	-	6	616	1,363	700	2,709	2,858	43,631	81	1	483	52,442
1964	1	6	65	583	166	1,161	1,099	13,715	2,845	-	424	20,058
1963	-	6	177	465	130	729	1,840	6,165	657	4	98	10,265
1962	-	2	26	-	9	12	38	80	5	-	16	186
1961	-	-	-	-	-	-	-	-	-	-	-	2/306
1960	-	8	-	-	-	-	-	-	-	-	-	-

1/Gulf of Alaska fishery was redesignated as Northern Area Distant-Water Bottomfish Fishery on September 1, 1967. The fishery was permitted to be conducted experimentally during the period 1960 to May 1965, and from June 1965 it was designated as a mothership-type fishery and licensed for full-scale commercial operations.

2/Catch composition is not given in the original Japanese table.

\* \* \*

## Japan (Contd.):

CANNED OYSTER EXPORTS  
HIT RECORD IN 1967

Japan's exports of canned oysters in 1967 were a record 869,000 cases--more than 200,000 cases above 1966. Exports of canned oysters boiled in water were 80 percent higher than 1966; exports of canned smoked oysters in oil only increased 23,000 cases over 1966. Total exports and major destinations:

Product	Country	Actual Cases	
		1967	1966
Canned smoked oysters in oil, 3 B-square ( $\frac{1}{4}$ -lb. sardine-style), 50/case	U. S. Canada Australia	291,364 82,438 33,738	277,823 55,158 50,886
Total. . . . .		447,476	424,147
Canned oysters boiled in water, No. 7 ( $\frac{1}{2}$ -lb. flat), 48/case	U. S. Canada Australia	370,472 24,009 7,866	201,522 14,736 6,553
Total. . . . .		412,298	230,779
Other canned oysters, No. 7 ( $\frac{1}{2}$ -lb.-flat), 48/case	U. S.	5,548	4,900
Total. . . . .		9,090	8,233
All products	U. S. Canada Australia	667,384 106,829 42,326	484,245 70,132 59,856
Grand total . . . . .		868,864	663,159

(Fishery Attaché, U. S. Embassy, Tokyo, from "Suisan Tsushin," March 1, 1968.)

\* \* \*

## 1967 SALMON CATCH WAS GOOD

The Fisheries Agency reported Feb. 28, 1968, that the 1967 Japanese North Pacific salmon catch in the areas of the Japan-USSR Fisheries Treaty was 114,873 metric tons: 52,333 tons in Area A (north of 45° N. latitude) and 62,540 tons in Area B (south of 45° N. latitude).

Japan's 1967 catch quota was 108,000 tons; 52,500 tons allotted to Area A, and 55,500 tons (plus 10-percent allowance) for Area B.

## Coastal Fishery

The Japanese coastal fishery harvested 13,581 tons to September 1967. This brought total salmon catch for 1967 to 128,454 tons. It was about 10,000 tons below the 142,001-ton catch in 1965 which, like 1967, was a good pink salmon year. The Fisheries Agency

states that the 1967 catch should approximate 1965's, when the coastal fishery catch for the entire year is tabulated.

## Species Makeup of Catches

The species composition of the 1967 salmon catches in Areas A and B and the coastal fishery was (1965 figures in parentheses): reds 20,493 tons (25,016 tons), chums 38,896 tons (45,739 tons), pinks 64,223 tons (62,991 tons), silvers, kings, and others 4,842 tons (8,255 tons); total 128,454 tons (142,001 tons). ("Shin Suisan Shimbun," Feb. 27, 1968.)

\* \* \*

## FROZEN TUNA EXPORT QUOTAS REDUCED

On March 7, the Japan Export Frozen Tuna Producers Association adopted new export quotas for frozen tuna exports in Business Year 1968--April 1968-March 1969. ("Suisancho Nippo," Mar. 9, 1968, and other sources.)

	BY 1968	BY 1967
<u>Direct shipment to U. S. from Japan:</u>	.. (Short Tons) ..	
Albacore. . . . .	30,000	35,000
Yellowfin . . . . .	25,000	35,000
Loins. . . . .	6,000	8,000
<u>Additional quota:</u>		
Albacore. . . . .	10,000	-
Loins. . . . .	2,000	-
<u>Indian Ocean transhipment to U. S.:</u>		
Albacore and yellowfin . . . . .	4,000	4,000
<u>Atlantic Ocean transhipment to U. S.:</u>		
Albacore. . . . .	20,000	25,000
<u>Additional quota, all tuna species. . .</u>	3,000	5,000
Quota for new members . . . . .	200	-
<u>Overseas base/1 quota . . . . .</u>	4,000	4,000
	.. (Metric Tons) ..	
<u>Italian quota:</u>		
Transhipment & direct export. . . . .	40,000	40,000
Additional quota . . . . .	3,500	500

<sup>1</sup>/Includes American Samoa, Espiritu Santo (New Hebrides), Fiji Island, Penang (Malaysia), and Saint Martin Island (West Indies).

\* \* \*

## REPORT ON TUNA FLEET OPERATIONS

In the last year or two, the main body of the Japanese tuna fleet has been concentrating on fishing more for the domestic market than for exports. Many long-liners have been fishing in the Tasman Sea off southeastern Australia. However, with the seasonal slowdown

#### Japan (Contd.):

there, a large number of those vessels are shifting to the Indian and Atlantic Oceans.

Japanese fleet operations in various ocean areas are:

**Indian Ocean:** About 90 long-liners are there, mostly concentrated between equator and 10° S. latitude. Practically none is fishing in the high latitude grounds south of 15° S. latitude.

Yellowfin fishing in western Indian Ocean off Mombasa, Kenya, is reported very good; many vessels are landing 3-4 tons, and as much as 6 tons, per day. Most vessels are equipped with a low-temperature, quick-freezing system and are bringing catches back to Japan. Albacore landings in the Indian Ocean are very small.

#### Atlantic Ocean

The Atlantic tuna fleet, which dwindled in the past few years, has been building up slowly. There are now about 70 vessels in operation. Close to 30 vessels are off Africa's west coast, near Pointe Noire. They are making good catches of yellowfin and big-eyed tuna; daily landings average 4-5 tons per vessel.

In the central Atlantic, about 20 vessels are fishing primarily for yellowfin and big-eyed; daily catches average 2.5-3 tons.

Off Puerto Rico, about 15 long-liners fishing for albacore are landing between 2-2.5 tons per vessel a day.

Seven to 8 vessels are off Angola, catching predominantly albacore--between 2.5-4 tons of fish a vessel.

#### South Pacific Ocean

Vessels operating out of American Samoa and other South Pacific tuna bases find very poor fishing. Landings in February and March 1968 averaged about one ton a day.

#### Tasman Sea

Fishing is very slow. Full-scale fishing in this region starts around July. ("Suisan Tsushin," March 28.)

#### 3 MORE TUNA PURSE SEINERS LICENSED FOR W. AFRICA

On March 12, the Japanese Fisheries Agency licensed 3 more purse seiners for the West African "experimental" tuna purse-seine fishery. The 3 were selected from 38 license applications. Now there are 9 in that fishery. The previous 6 were 4 two-boat seiners now off West Africa and 2 one-boat seiners scheduled to begin this year.

#### Smaller Fleet In Wider Area

The Agency decided not to enlarge the fleet beyond 9. By having a smaller fleet operate over a wider area, it felt it could assess better the purse-seine method's effectiveness. If the performance of the 9 is satisfactory, the Agency intends to license their operation on a commercial scale.

#### Purse Seiners' Better Results

In the West African tuna fishery, other countries, including Spain, France, Yugoslavia, the U. S., and Canada, are also purse-seining for tuna.

Japanese purse seiners which began operating in 1964 are progressively achieving better results in skipjack and yellowfin fishing. It is conceivable that Japanese tuna fishing off West Africa may eventually shift from traditional long-lining to purse seining. ("Suisan Keizai Shimbun," Mar. 14, and other sources.)

\* \* \*

#### FRESH AND FROZEN TUNA PRICES

Albacore tuna prices on the Japanese domestic market in the latter part of March 1968 were holding steady at around ex-vessel US\$454 a short ton. Yellowfin prices were softening somewhat, bringing around ex-vessel \$365 a short ton. Frozen round albacore for export to the U. S. have undergone very little price change in the past 6 months; these have been averaging \$515 a short ton, c. & f., delivery California. Gilled-and-gutted yellowfin were being sold to California packers in March at around \$435 a short ton, c. & f.

#### Atlantic Albacore

Prices for Atlantic-caught albacore (round) exported to Puerto Rico have been holding

### Japan (Contd.):

steady. In early March 1968, prices were quoted at \$450 a short ton, f.o.b. Sao Vicente, Cape Verde Island. Early March 1968 prices for other tuna transshipments to Puerto Rico from that island were: yellowfin (g. & g.) f.o.b. \$395 per short ton; big-eyed (g. & g.)--\$260 per short ton. ("Suisan Tsushin," Mar. 30, and "Suisan Shuhō," Mar. 25.)

\* \* \*

### DISTANT-WATER BOTTOMFISH ASSOCIATION FORMED

The Japan Distant-Water Bottomfish Fishery Association was formed March 26, 1968. It represents 41 Japanese trawling firms operating 12 motherships and 116 distant-water trawlers. It combines the Overseas Trawler Association and the Northern Water Bottomfish Association, both dissolved and enlarged into a single organization.

Masao Okai, Vice President, Kyokuyo Hogei Fishing Co., was named board chairman and executive director.

### 1968 Plans

Business plans for 1968 include: (1) promote settlement of international fishery problems; (2) improve communication with private organizations in coastal countries; (3) collect foreign information and assess international situation; (4) advise on ways of increasing effectiveness of fishing ground exploratory surveys undertaken by the government-operated research vessel "Kaiyo Maru." ("Suisancho Nippo," March 28, 1968.)



**India**

### SHRIMP INDUSTRY CONTINUES TO EXPAND

For the first time, India's Madras State is actively exporting shrimp. This recent development follows the building of a fleet of 591 mechanized boats. Boats ranging from 25 to 42 ft. are being turned out by the 4 yards at Royapuram, Nagapattinam, Marina, and Mandapam.

Shrimp are about 4 percent of total landings in Madras State. Landings there have increased from 100,000 tons before the 5-year plan to 250,000 tons now. Though shrimp landings are small, the potential is considerable. With more systematic and organized trawling, the catch could be tripled within 2 years.

Four ocean-going trawlers, each capable of landing 100 tons of fish a year, are being built in Calcutta.

Three freezing plants are being erected at Ennore, Mandapam, and Tuticorin. They will have a total capacity of 16 tons a day.

Madras State provides the bulk of spiny lobster tails exported from India. The lobster ground along the Kanyakumari coast is considered the richest in India.

Shrimp and sardines are being canned in the State. A factory at Tuticorin has a capacity of 5,000 eight-oz. cans a day. The products will be marketed in India and abroad.

### Bombay

Full exploitation of the rich shrimp stocks off Bombay has been hampered by lack of shore facilities to handle the catch close to the fishing grounds. At times, shrimp have been taken only 50 miles from Bombay, but inadequate supplies of fresh water and space at Sasoon dock necessitated long journeys to Cochin for processing.

In its 1967 annual report, New India Fisheries, Ltd., says provision is being made to install a 10,000-gallon fresh-water underground tank at Sasoon dock. Also to be erected is a shed for peeling, deveining, and processing shrimp for home consumption and export.

Around a thousand vessels are fishing for shrimp in the Cochin area. A heavy toll is being taken of stocks, and catches have shown a downward trend.

Two more bases are planned by the company. These will allow it to fish all along India's west coast.

### India (Contd.):

It is envisaged that gill-netting for large shoals of pomfret off the coast will be carried out in addition to fishing for shrimp. ("Fishing News International," March 1968.)



### Taiwan

#### FISHERIES ARE EXPANDING

In 1967, the Republic of China (Taiwan) landed a record 458,000 metric tons of fishery products--7.7 percent above 1965. The growth rate in fisheries production during 1967 did not match the phenomenal rate of 11.4 percent in 1966, yet it was as high as the Soviet production growth rate for 1967. The largest increases were in the high-seas fisheries because large tuna long-liners were added to the fleets. At the end of 1967, Taiwan had 260 long-liners.

#### Exports Soared

As a result, exports of frozen tuna (mostly to the U. S.) reached amounts undreamed of only a few years ago: in 1967, Taiwan exported 39,000 metric tons of frozen tuna worth US\$13.8 million; total fishery exports exceeded US\$20 million. Planned fishery exports for 1968 are \$30 million. (Letter from T. P. Chen, Chief, Fisheries Division.)

In 1968, the first year of the 5-Year Plan, Taiwan plans to land 530,000 metric tons of aquatic animals and plants; by 1972, when the 5-Year Plan ends, a planned 800,000 tons of fishery products will be landed. During this 5-Year period, US\$146.2 million will be invested in the construction of fishery vessels having a capacity of 122,000 gross tons. ("Taiwan Industrial Panorama," Jan. 1968.)



### Pakistan

#### USSR AIDS FISHERIES

In early March 1968, a team of Soviet experts arrived in Karachi to explore the pos-

sibilities of greater fisheries cooperation between the USSR and Pakistan. They visited fishing port and fish-processing plants, then went to Rawalpindi for talks with officials. Visits to various East Pakistan fishing centers were also scheduled. The mission is probably a followup to the Soviet Fisheries Minister's visit to Pakistan in late 1967 and commitments made then.

#### Suez Closing Hurts USSR

Soviet Indian Ocean fisheries have been severely hampered by the 1967 closure of the Suez Canal. It forces the Black Sea fishing fleet to go around the Cape of Good Hope, greatly prolonging trips and increasing production costs. The Soviets tried to partially offset this disadvantage: they began fishing for shrimp off West Africa in early 1968. Shrimp is important to the USSR as a dollar earner.

Other Indian Ocean fisheries are hurt, and it is conceivable that the Soviets are trying to secure a major fishing base in one of the nearby coastal states.



### Malaysia

#### SHRIMP INDUSTRY OF SABAH

In 1967, trawlers of the State of Sabah, Malaysia, landed more than 3,100 metric tons of shrimp: 2,900 tons in Sandakan, the balance in Labuan and Tawau. There are 2 freezing plants in Sandakan and 1 in Labuan.

Sabah's exports of frozen shrimp were about 1,500 tons worth M\$6.6 million (US\$2.2 million). This was about 38 percent more than the production and value in 1966.

In 1966, Sabah exported 1,085 tons of frozen shrimp worth M\$4.8 million (US\$1.6 million).

Most of the exported shrimp goes to the U. S. as large frozen blocks for institutional (not consumer) use. (U. S. Consulate, Kuching, Feb. 26, 1968.)



## CARIBBEAN

### More Freezer Trawlers Active in Shrimp Fishery

Since 1966, over 70 shrimp trawlers in the Gulf of Mexico and the Caribbean Sea have been equipped with freezers. The primary advantages gained have been longer fishing time, increased range, and freedom from land-based processing stations. Government officials, processors, and fishermen's representatives from countries in Central America and northern South America have voiced concern over the increase of foreign (mainly U. S.) freezer vessels. They view them as a threat to their established shore-based operations; they fear the trend may harm their own industries.

#### A Beginning in 1961

Freezer vessels have operated in the Caribbean for several years. One vessel operated from Puerto Rico in 1961, but it returned to the U. S. in 1963 because the freezer unit did not work properly. According to industry sources, the big turn came after 1965, when Westinghouse developed a dependable freezer unit for small trawlers. The unit received wide acceptance in 1966. By summer 1967, over 50 vessels had freezers in the Gulf, and 20 in the Caribbean. Of the 20, 16 were based in Trinidad, and 2 each in Surinam and Puerto Rico. All 20 fished along the northern coast of South America.

### Freezer Trawlers Well Suited

The freezer trawlers have proved well suited to the fishery along northern South America. Great distances must be covered to fish the Amazon grounds, and the vessels have proved their worth. For instance, four larger vessels built in 1967 have been able to operate from Trinidad to as far south as Recife, Brazil; they remain independent of a base station for 3 months. The vessels have proved so successful that reports from Trinidad indicate all ice vessels operating from there are to be retired or be converted to freezer vessels this year. Gulf-based vessels already have fished off Guianas and returned to Florida with their catch. No doubt others will follow this winter when fishing drops off in the Gulf of Mexico.

#### What Effects?

The result of greatly increased activity by freezer trawlers is not certain. If past experience is a guide, the following implications may be drawn: As the number of freezer vessels increases, the importance of land stations will diminish. Governments of countries maintaining land stations (particularly foreign-owned) can be expected to become more accommodating in order to retain the stations. But, also, there will be concern by governments that see the livelihood of their fishermen and their income from export taxes threatened by distant-water fishermen. (U.S. Embassies in Latin America, and other sources.)



## AFRICA

### Commercial Shrimping on West African Coast Grows

The shrimp fishery is developing in many parts of the world. Known fishing grounds are exploited more intensively each year; new ones are being discovered and their exploitation frequently is undertaken at a rapid rate.

Until recent years, the west coast of Africa, from Senegal to Angola, was not included in this development. But several species of shrimp were known to be there. Native fisheries were carried out in the lagoons or near the coast (pots, nets, traps); and trawl fisheries for finfish, until recent years, caught shrimp occasionally.

#### Began In 1963

It was not until 1963 that the first exploratory fishing dedicated wholly or in large part to shrimp began. Some was conducted by official research organizations, some by private vessels. Results were favorable. Since 1965, a commercial fishery for shrimp has been developing in tropical Africa.



### Mozambique

#### SHRIMP FISHING FIRM REORGANIZES

The general manager of the newly nationalized Portuguese firm in Mozambique--INOS (Industria de Peixe N. S. de Fatima)--says it will carry out an 8-boat expansion of its northern shrimp trawling fleet. Also, it is converting all its trawlers for packing and freezing at sea. The present supply base for trawling fleet at Antonio Enes will be eliminated. Operations in the north are to be concentrated at Porto Amelia. Trawling with 4 boats for deep-sea shrimp will continue out of Lourenco Marques.

To expand its shrimp trawling fleet, INOS is relying on U. S. technicians and boat designs.

INOS views the U. S. as its main market for frozen shrimp. It hopes that with an en-

larged fleet of 15 boats at Porto Amelia, and increased shrimp landings there, it can persuade U. S. shipping lines (Moore McCormack and Farrell) to stop at Porto Amelia for shrimp cargoes.

#### Basic Reorganization

INOS has had continuing financial difficulties and personnel changeover this year. Its main hopes for becoming profitable rest on a reorganization of its packing and freezing methods. Of its 11 shrimp trawlers, 7 operate out of Porto Amelia and 4 out of Lourenco Marques. All 11 have been or are being equipped for packing, blast-freezing, and storing shrimp on board. These vessels will be able to operate for 25 days at sea and then deliver their shrimp ready processed to the INOS cold-storage facilities at Porto Amelia or Lourenco Marques.

INOS hopes the new system will produce higher grade packed shrimp and fewer losses from breakage. Lower grade and greater breakage occur when shrimp are stored in ice at sea, unloaded into trucks at Porto Amelia, and finally packed in the cold-storage warehouse some distance away.

#### U. S. Designs and Techniques

INOS is relying considerably in its reorganization plans on the experience of the U. S. Gulf of Mexico shrimp trawling industry. A designer from Rockport, Tex., has been in Lourenco Marques to advise on the design of the 8 shrimp trawlers. The designs will be prepared by a Rockport firm and be the Gulf Coast type modified for local conditions.

#### To Build Vessels Locally

Nationalized INOS must have these vessels built on Portuguese territory. It probably would prefer it anyway for public relations purposes.

#### U. S. Senior Skipper

INOS has hired a U. S. trawler captain of Portuguese descent as senior skipper of its trawling fleet at Porto Amelia. He helped develop shrimp fishing in Kuwait waters.

### Mozambique (Contd.):

#### Deep-Sea Shrimp Trawling in South

The 4 trawlers based in Lourenco Marques are now fishing for deep-sea shrimp out along the 280- to 300-fathom line. Still in experimental stage, the fishery appears promising. But INOS will restrict fleet to the 4 for the time being. When the 8 Rockport-type vessels are built, they will operate from Porto Amelia.



### Libya

#### POLAND AIDS FISHERIES

Almost 2 years ago Poland announced that she would extend aid to Libyan fisheries. In late November 1967, the Libyan Undersecretary in the Ministry of Industries (Abdalaziz Kamaal) left for Poland to sign the contract to buy 33 fishing boats from the Polish firm CENTROMOR. The first of the 33 vessels departed Gdynia for Libya in mid-March 1968. Named "Al Muktashef," the vessel is 90.2 feet long, has a crew of 24, and will be used for scientific research, probably in the Mediterranean. Fishery experts from the Polish fishery firm DALMOR, in Gdynia, will be sent to Libya to train local fishermen in use of new vessels and fishing techniques.

#### Bulgarian Interest

This is not the first time Soviet Bloc countries have shown interest in Libyan fisheries. In 1963, a directive of the Bulgarian Communist Party mentioned the "expansion of Bulgaria into Mediterranean fishing." This never occurred, as far as is known.

The Libyan order for 33 fishing vessels consists of: 2 training and fishery research vessels (90 feet, steel); 2 trawlers (66.6 feet, wooden); 18 line and net fishing boats (40.3 feet, wooden); 10 line and net fishing boats (small, wooden); 1 patrol and fishery inspection vessel.



## MID EAST

### Kuwait

#### GULF FISHERIES CO. LEADS REGION IN SHRIMP FISHING

The Gulf Fisheries Co., Ltd., of Kuwait, the leading shrimp fishing firm in the Middle East, continues to diversify its interests. It has made several international investments in fishing, food processing, light manufacturing, and oil exploration in the Middle East, Africa, and the Far East. The firm's partners are Shaikh Sabah Al-Ahmad, Kuwait's foreign minister, Al-Rashed, a businessman, and Dr. Khalil Mahmoud, the general manager. Al-Rashed is not connected with the nonfishing activities.

#### Its Assets

Gulf Fisheries has assets (fleet and plant) of US\$13 million; capitalization of US\$2.9 million; an estimated US\$6 million in reserves; 1,600 employees in season, 900 out of season; 61 ships, including 3 motherships and 2 combination stern trawler-motherships. Fiscal 1967 sales were US\$14 million.

Delivery of 40-50 more vessels is expected during 1968-69. Many of these will be built in Poland.

Gulf Fisheries is represented in the U. S. by Crest Importing, San Diego, Calif., and International Fisheries, New York City.

#### Farflung Interests

The company owns fishing concessions in the waters of Iran, Somalia, Nigeria, and Indonesia. Forty-three of its vessels are in the Persian Gulf, but the high royalty paid the Iranian Government may cause the fleet to be shifted elsewhere.

Gulf has begun fishing for tuna off Somalia under the name of Somali-American Fishing Co. It has a cannery in Alula. Four vessels are operating off Nigeria; their catches have been poor. In Dahoman waters, 3 vessels are fishing with exclusive rights to shrimp, lobster, and all other crustaceans. Small catches and Dahomey's political instability are causing Gulf to lose interest there. Late in 1967, 21 vessels started fishing near Indonesia.

The company's interests will probably be incorporated under the name of Gulf International (estimated 1968 sales: US\$50 million). (U. S. Embassy, Kuwait, Mar. 7, 1968.)

▲ ▲ ▲ ▲ ▲

## INDEX

Page		Page	
	<b>UNITED STATES:</b>		
1 ..	The U. S. Edible Fish Situation	45 ..	<b>INTERNATIONAL (Contd.):</b>
3 ..	Shellfish Prices Expected to Remain High in 1968	46 ..	Soviet Research Vessel Visits India and Burma
4 ..	U. S. Studies Effects of Imports on Some Fish	46 ..	World Fishery Trade Rose Again in 1966
4 ..	Fur Seal Auction Held	46 ..	Fish Oil Prices Decline
4 ..	Walleye Tagging Study Slated for Eastern Lake Erie	46 ..	FAO Conference on Fishing Ports & Port Markets: Bremen, September
5 ..	Udall Approves Clean-Up Program for Lake Michigan	47 ..	FAO-UNESCO Symposium on Caribbean Sea
6 ..	Cut Weight Loss When Smoking Halibut and Salmon	47 ..	Symposium Held on Suppressing Odors in Fishery Byproducts
6 ..	Sport Fishing Licenses Rose Slightly in FY 1967	47 ..	1967/68 Antarctic Whale Catch Reported
	Oceanography:	48 ..	International Whaling Commission Calls 2 Meetings
7 ..	Sea Bottom Off Oregon Mapped	48 ..	Southeast Asia Fisheries Center Council Meets
7 ..	Six-Month Hydrographic Survey of Massachusetts Coast Underway	48 ..	Dutch Hydrographer Warns of Polluted Seas
8 ..	Geologic Study of Gulf of Mexico Begins	49 ..	Atlantic Tuna May Come Under International Protection
9 ..	Whales Observed in Western Gulf Stream		<b>FOREIGN:</b>
12 ..	Navy Tracks Herring Zone for Iceland	51 ..	<u>Canada:</u>
13 ..	Scripps 'STYX' Survey Underway	51 ..	Landings and Value Fell in 1967
13 ..	U. S. Scientists Investigate North Pacific Polar Front	51 ..	British Columbia Herring Landings and Products Fall Sharply
14 ..	Foreign Fishing Off U. S. in March	51 ..	Quebec Fishermen Broke All Catch Records in 1967
	<u>States:</u>	51 ..	Conference on Fishing Vessel Construction Materials Scheduled
	California:	52 ..	Review of Fishery Subsidies
19 ..	1967 Annual Report on Fish and Game Issued	53 ..	New Brunswick Begins Fish Inspection
	Alaska:	53 ..	Canadian Production of Fishery Products in 1967 and 1966
19 ..	Coast Guard and BCF Write Safety Booklet for Fishermen		<u>Europe:</u>
20 ..	Udall Condems Water Pollution Caused by Oil Operations	54 ..	<u>USSR:</u>
20 ..	Set Quotas for Herring-Spawn-on-Kelp Fishery	54 ..	Enters World Fish Meal Markets
	<u>Oregon:</u>	54 ..	FAO Seminar on Fish Culture
20 ..	Coho Salmon Releases Completed	54 ..	To Study North Atlantic Currents
21 ..	New Dam Threatens Chinook Run		<u>Netherlands:</u>
22 ..	New Fish-Marking Method Approved	54 ..	Assists Fishing Industry
	<u>Washington:</u>	55 ..	United Kingdom:
22 ..	Aquarium Facility to be Built on Puget Sound	55 ..	1966-67 Catch in England and Wales
	<u>Massachusetts:</u>	55 ..	Extra Subsidies Given to Fishing Trawlers
23 ..	Boston Harbor Pollution Conference Called	55 ..	"Fishing News" Directory and Equipment Guide Available
23 ..	Commercial Factory to Produce FFC Is Dedicated		<u>Norway:</u>
23 ..	Boston Pond Has Trout Fishing	55 ..	Fishing Industry Gets Extra Subsidy
	<b>ARTICLES:</b>	56 ..	West Norway Herring Fishery Fails
24 ..	Trends in the Atlantic Sea Scallop Fishery, Julius A. Posgay	56 ..	Coastal Fisheries Are in Trouble
27 ..	Competition for Aquatic Environment, by Dr. Roland F. Smith	56 ..	Bulgaria:
30 ..	U. S. and Japan Conduct Salmon Research in Cooperative Cruise, by Robert R. French	57 ..	Builds Fishing Vessels for USSR
34 ..	Parachute-Type Sea Anchor, by Fred W. Hopkins	57 ..	Portugal:
	<b>INTERNATIONAL:</b>	57 ..	Production and Exports of Fish Meal and Oil
36 ..	Report on Food from the Sea Issued by UN	57 ..	Greece:
42 ..	Annual Meeting of Inter-American Tropical Tuna Commission	57 ..	1967 Catch was Down
43 ..	Poland and Ireland Sign Fishery Trade Agreement	57 ..	Denmark:
43 ..	Norway and Indonesia Agree on Joint Venture	58 ..	Greenland Seal Skins Auctioned
43 ..	Chile and Peru Differ on Japanese Survey	58 ..	Spain:
44 ..	North Pacific Fur Seal Commission Meets in Moscow	58 ..	Vigo Is Europe's No. 1 Fishing Port
45 ..	Tuna Fleets of Taiwan, Japan, and South Korea	58 ..	A Promising Tuna Market
45 ..	France:	58 ..	France:
	France and USSR Cooperate on Fishery Matters	59 ..	Ocean Study Will Help Fishing
		59 ..	Ireland:
		59 ..	Fishing Industry Growth Continues, Reports Board
			<u>Latin America:</u>
		61 ..	Mexico:
		61 ..	Sets Closings and Sizes for Spiny Lobsters, Shrimp, Turtles
		61 ..	French Exploratory Fishing Vessel Goes on Reef

Index continued page 72.

## INDEX (CONTINUED)

Page	FOREIGN (Contd.): <u>Latin America</u> (Contd.): Honduras: 61 .. Orders Shrimp Vessels from Spanish Firm	Page	FOREIGN (Contd.): <u>Asia</u> (Contd.): Taiwan: 67 .. Fisheries Are Expanding
61 ..	Argentina: 61 .. Catch and Output of Fishery Products Continue Upward	67 ..	Pakistan: 67 .. USSR Aids Fisheries
	<u>Asia:</u> Japan: 63 .. Trawl Fishery Production in Northern Waters	67 ..	Malaysia: 67 .. Shrimp Industry of Sabah
64 ..	Canned Oyster Exports Hit Record in 1967	68 ..	<u>Caribbean:</u> 68 .. More Freezer Trawlers Active in Shrimp Fishery
64 ..	1967 Salmon Catch Was Good	69 ..	<u>Africa:</u> 69 .. Commercial Shrimping on West African Coast Grows
64 ..	Frozen Tuna Export Quotas Reduced	69 ..	Mozambique: 69 .. Shrimp Fishing Firm Reorganizes
64 ..	Report on Tuna Fleet Operations	70 ..	Libya: 70 .. Poland Aids Fisheries
65 ..	3 More Tuna Purse Seiners Licensed for W. Africa	70 ..	<u>Mid East:</u> 70 .. Kuwait: 70 .. Gulf Fisheries Co. Leads Region in Shrimp Fishing
65 ..	Fresh and Frozen Tuna Prices		
66 ..	Distant-Water Bottomfish Association Formed		
66 ..	India: 56 .. Shrimp Industry Continues to Expand		



## CAN FISH LEARN TO AVOID FISHERMEN?

Can fish learn that it is dangerous to get in the path of a trawl or to get too interested in a hook? Mr. J. H. S. Blaxter of the Marine Laboratory, Aberdeen, has researched the ability of fish to learn by experience.

Fish learn by association. In a tank, they will learn to associate a stimulus in the form of a noise, taste or temperature change with "feeding time". Thus stimulated, they will learn to go where food has been given. One test involved swimming up a slight ramp. Soon the fish would swim up the ramp when stimulus was applied without food.

About 30 "stimulating" experiences are needed to establish a new behavior pattern that, once learned, can be retained up to 9 months.

It is not known how often fish may avoid commercial fishing gear. Salmon and trout, threatened repeatedly by the angler, can become difficult to catch, having learned success through each survival experience. Age brings experience, but it also brings greater size and swimming power--up to a point, when old age might diminish the powers of escape. Which is the operative factor?

Tank experiments may show whether this escape knowledge can be passed to other fish (an older fish leading others from danger). However, tank fish behavior may differ from that of ocean fish. Science hopes to find answers through research. ("World Fishing.")

Created in 1849, the Department of the Interior—America's Department of Natural Resources—is concerned with the management, conservation, and development of the Nation's water, fish, wildlife, mineral, forest, and park and recreational resources. It also has major responsibilities for Indian and Territorial affairs.

As the Nation's principal conservation agency, the Department works to assure that nonrenewable resources are developed and used wisely, that park and recreational resources are conserved for the future, and that renewable resources make their full contribution to the progress, prosperity, and security of the United States—now and in the future.

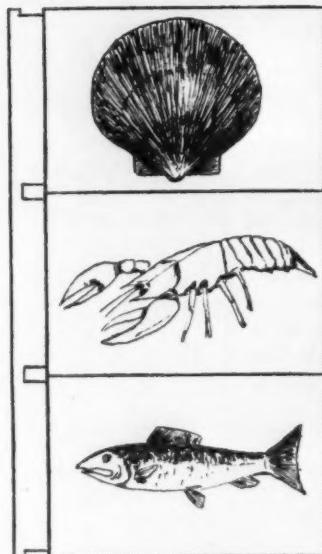


UNITED STATES DEPARTMENT OF THE INTERIOR

U.S. FISH AND WILDLIFE SERVICE  
BUREAU OF COMMERCIAL FISHERIES



# Fishery Motion Pictures



The Bureau of Commercial Fisheries plans, supervises production, and distributes educational motion pictures sponsored and financed by fishing industry organizations.

23 fishery motion pictures are distributed free upon request through 200 Government and private film libraries in the United States. A catalog listing these films may be obtained by writing Audio-Visual Services, Bureau of Commercial Fisheries, 1815 N. Ft. Myer Drive, Room 601, Arlington, Virginia 22209.

es